THE TAMIL NADU SURVEY MANUAL
OF
DEPARTMENTAL RULES

(Compiled under the orders of Government)

By

Thiru T. N. SUBRAMANIAM, M.I.S.,
Assistant Director of Survey and Land Records
Under the immediate Superintendence of

Thiru S. GANESAN, B.A., M.I.S.,
Deputy Director of Survey and Land Records and
Technical Advisor to the Board of Revenue, Madras-5.

(IN THREE VOLUMES)

VOLUME II

©
GOVERNMENT OF TAMIL NADU
1984

PRINTED BY THE DIRECTOR OF STATIONERY AND
PRINTING, MADRAS, ON BEHALF OF THE
GOVERNMENT OF TAMIL NADU
1984

PRICE:

THE TAMIL NADU SURVEY MANUAL
OF
DEPARTMENTAL RULES

(Compiled under the orders of Government)

By

Thiru T. N. SUBRAMANIAM, M.I.S.,
Assistant Director of Survey and Land Records
Under the immediate Superintendence of

Thiru S. GANESAN, B.A., M.I.S.,
Deputy Director of Survey and Land Records and
Technical Advisor to the Board of Revenue, Madras-5.

(IN THREE VOLUMES)

VOLUME II

©
GOVERNMENT OF TAMIL NADU
1983

PRINTED BY THE DIRECTOR OF STATIONERY AND
PRINTING, MADRAS, ON BEHALF OF THE
GOVERNMENT OF TAMIL NADU
1983

TAMIL NADU SURVEY MANUAL, VOLUME II.

CONTENTS.

CHAPTERS.		PAGE.
XVIII	Duties of Officers	1
XIX	Duties of Surveyors	17
XX	Office routine	25
XXI	Central Survey Office	67
XXII	Drawing, Printing and Publication of Maps ..	91
XXIII	Photo Zinco Press	117
XXIV	Survey Instruments	174
XXV	Aids to Surveying	259

APPENDICES.

XII	Appointments and Training of Upper Subordinates—Syllabus for the training of Junior Draftsmen and Surveyors.	336
XIII	Appointment and training of Assistant Director of Survey.	345
XIV-A	Reference sheet of Topographical details appearing in Taluk Maps.	349
XIV-B	Reference sheet of Topographical details appearing in District Touring Maps.	356
XIV-C	Reference sheet of Topographical details appearing in District Atlas.	361
XV	Outturn and pay of Surveyors	364
XVI	List of Sub-processes and outturn in Surveys ..	366
XVII	Theodolite Surveys—Rules for reading and recording of angles by repetition.	433
XVIII	Cost of work	435
XIX	Instructions for preparation of original drawing for reproduction by Vandyke process.	437
XX	Instructions to prevent injury to Records during transit.	439
XXI	Tamil Nadu Survey Departmental Tests	442
XXII	Instructions regarding the submission and receipt of petitions addressed to the Board of Revenue.	448
XXIII	Notes on hand typing	451

CHAPTERS.	APPENDICES—*cont.*	PAGE.
XXIV	Rules for the due maintenance of Store accounts and Recovery of cost of lost and damaged articles.	456
XXV	List of records to be retained and destroyed in the District Survey Unit Office.	465
XXVI	Instrctions for investigation and Settlement of boundary disputes under the Tamil Nadu Survey and Boundaries Act VIII of 1923.	474
XXVII	List of Returns due from Survey Units	488
XXVIII	Form of questionarie for the Annual Office Inspection of the Office of the Assistant Director of Survey and Land Records (District Survey Unit) by the Joint Director of Survey and Land Records, Chepauk, Madras.	507
XXIX	Financial powers delegated to subordinate officers of the Survey and land Records Department.	527
XXX	Standard specifications for survey instruments ..	543
XXXI	Form of notice calling for tenders for the supply of demarcation stones.	544
XXXII	G. O. Ms. No. 502, Revenue, dated 10th February 1958, as amended.	548
XXXIII	Specimen of Taluk and District Maps	643
XXXIV	Precautions against Fire	648
XXXV	Specimen Reference Sheet Showing various types.	649

THE
TAMIL NADU SURVEY MANUAL
OF
DEPARTMENTAL RULES

VOLUME II

CHAPTER XVIII.

DUTIES OF OFFICERS.

The Commissioner of Land Revenue and Settlement is the Administrative Head of Survey and Land Records Department. The Joint Director of Survey and Land Records is the Technical Head of the Department.

DEPUTY|ASSISTANT DIRECTORS.

The Deputy|Assistant Director of Survey and Land Records of each district Unit will be in charge of all items of regular survey including the Mobile and adhoc items of work and also the maintenance of Land Records. He will perform his duties and responsibilities in his capacity as Personal Assistant to the Collector in all items of Survey Works and Maintenance of Land Records in the District. This will not, however, affect his statutory functions to be exercised in his capacity as Deputy|Assistant Director of Survey and Land Records. The Central Survey Office is a separate Unit in charge of a Deputy Director. The Deputy|Assistant Directors are responsible for the proper working, good order and discipline of the staff under their control. The instructions given below relate to the regular survey items of work done under his direct control. Those regarding the maintenance of land records are detailed in the Chain Survey and Land Records Manual Parts I—II. The instructions relating to the Central Survey Office are detailed separately.

2. *The Chief Duties of the Survey Unit Officers are.*—(1) To see that the provisions of the Tamil Nadu Survey and Boundaries Act, 1923, are complied with strictly.

(2) To keep his staff efficient and up to its full strength.

(3) To be constantly watchful that sufficient field work is in hand to keep all branches of his office employed, that the office work keeps pace with the field work and that all processes of field and office work follow one another in due order and without delay;

(4) to regulate the outturn of each process of work so that a uniform rate of progress may be secured monthly and the estimated outturn for the year réalized within the limit of expenditure allowed ;

(5) to test field and office work and to satisfy himself generally that no incorrect record bears his signature.

(6) to examine and check the cash book daily while at head-quarters and the cash balance monthly and to check the security pass books, bonds, etc., at least once a year.

(7) to check the expenditure of stores and stationery and to see that instruments are kept carefully and in working order.

(8) to see that all returns prescribed are submitted on the dates prescribed and that the figures furnished in the returns are correct.

(9) to see that all records ripe for destruction are destroyed annually and that no unnecessary records are allowed to accumulate.

3. The most important of the returns due from the Survey Unit Officer is the Administration report due to the Joint Director of Survey and Land Records in May and October of each year.

It should contain a clear and concise statement of the operations of the Survey Unit under the following heads:—

(1) Name of Survey Unit Officer and period of charge.
(2) Forecast and outturn.
(3) Tests of accuracy.
(4) Expenditure.
(5) Survey advances.
(6) Cost of work to Government and to ryots.
(7) Field inspection by Gazetted Officers.
(8) Service Books.
(9) General remarks.

4. General questions must not be raised in periodical reports nor should such reports be made the occassion for soliciting orders on individual cases.

5. When an Additional Officer is attached to the District Unit, allocation of work between him and the Unit Officer will be done by the Collector in consultation with the Joint Director of Survey and Land Records. An Additional Officer will do, not less than 12 field inspection in a month.

The diaries of all the Deputy|Assistant Directors and Additional Assistant Directors will be sent on the 5th of every month to the Director of Survey and Settlements through the Joint Director of Survey and Land Records.

6. Appointments and promotions to the several posts in the subordinate service and the conditions of service, promotion etc., are governed by the special rules for the service framed for this purpose.

7. The powers of appointment and of promotion of upper subordinates except Assistants subject to the provisions in the special rules for the service, and of punishments like reduction, discharge, or dismissal of upper subordinates except Assistants subject to the provisions in the Civil Service (Classifiication, Control and Appeal) rules vest with the Joint Director.

Copies of orders of appointment in the case of candidates selected by the Tamil Nadu Public Service Commission for appointment as Junior Assistants or typists should be sent to the Commission.

Appointments made under the emergency provisions should be reported to the Tamil Nadu Public Service Commission, every month.

8. The Survey Unit Officer should maintain "Record Sheets" in the prescribed form for all the subordinates in the Unit in which the punishments awarded should be ordered and attested by him. [G O. Ms. No. 928 Public (Services-J), dated 4th April 1972.).]

The record sheets should be closed once a year at the end of March. A certificate should then be recorded in the Record Sheet by the custodian to the effect that all punishments awarded during the preceding year have been duly noted in the Record Sheet. If no punishment was awarded during the year a 'nil' entry shall be recorded. [G.O. Ms. No. 2200, Public (Services-J), dated 4th September 1972]. All the punishments entered in the Personal Files prior to 1st March 1972 should be carried over to the Record Sheets. [G.O. Ms. No. 2605, Public (Services-J), dated 27th October 1972]. In the case of Last Grade Government Servants, defaulter sheets should be maintained, and punishments awarded entered in it, then and there.

9. The Survey Unit Officer may suspend from service any subordinate where an enquiry into grave charges is contemplated or is pending subject to the conditions laid down in [G.O. Ms. No. 1145 (Confidential) (Public Services-B), dated 15th June 1965].

10. Recovery of the cost of revising the bad work or of correcting faulty work is a suitable punishment for bad work. Besides recovery of cost of correction it may sometimes be necessary to impose suitable punishments, referred to in the Civil Service (Classification Control and Appeal) Rules for specific defaults. In no case should more than one third of a month's pay be recovered in a month. It will, in most cases, be preferable to warn the defaulter in writing once, or often if necessary, and if this does not have the desired effect, other punishments referred to in rule 8 of Civil Service (Classification Control and Appeal) Rules such as Censure, reduction of rank, stoppage of increment, removal from service, etc., may follow.

11. The Survey Unit Officer should not impose fines on any one other than last grade Government Servants. To impose the penalties specified in Rule 8 of the Civil Service (Classification, Control and Appeal) Rules, on any member of the service, the procedure prescribed in Rule 17 of the said rules and the instruction in Government Memo. No. 4353|70-10, Public Service-B. dated 25th June 1971 shall be followed.

12. The Survey Unit Officers should maintain a register in form No. 58 for each field surveyor showing the monthly outturn, pay earned and passed and the punishment, if any, awarded to him. Regular charges must be framed, when it is proposed to punish individuals whose outturn is continuously short. An Officer's past record should not be taken into account in arriving at a finding as to the truth or otherwise of the charges against him. It may, however, be taken into account in assessing the punishment to be awarded, after the charges have been proved, and if it is intended to do so, the person charged should be appraised of the fact that his previous record and penalties imposed on him would be taken into account in deciding the question of punishment. He should be allowed to inspect the relevant records relating to his past service, if he so desires.

13. The Survey Unit Officer may issue such supplementary orders for the guidance of his subordinates as may appear necessary, provided they are not at variance with those in the Survey Manual.

14. The Survey Unit Officer can grant leave under the Fundamental and other rules, to any lower subordinates. In the case of upper subordinates except. Assistants he must submit the leave application to the Joint Director of Survey and Land Records, with his recommendation.

15. The Survey Unit Officer may grant casual or compensation leave to his subordinates, subject to the following conditions:—

Casual leave can be availed of by a Government Servant for seven days at a time. Casual leave, compensation leave and authorised holidays (including optional religious holidays) may be combined and availed of, subject to the condition that the total period of absence from duty does not exceed 10 days at a time. Temporary Government servants are eligible for a day's casual leave for every month of service put in by them. They are also eligible for one optional religious holiday for every four months of service put in.

16. The Joint Director of Survey and Land Records may grant casual and compensation leave to the Deputy|Assistant Director of Survey and Land Records, Deputy Director of Central Survey Office

and the Works Manager and the Collector concerned to the Deputy|Assistant Directors in the Districts, subject to the conditions referred to in rule 15.

17. When an Officer intends to apply for long leave, he should notify his intention three months before the proposed date of departure. Applications for such leave should be sent not later than six weeks before the date from which it is required.

18. All Officers proceeding on leave will report their leave address to the Joint Director of Survey and Land Records.

19. On transfer of the charge of a Unit, the Officer assuming charge should carefully examine the cash, store, stationery, and other Government property. He will also satisfy himself that the returns correctly show the progress made in field and office work and that all completed records have been signed. He will immediately after assuming charge, submit a report to the Joint Director of Survey and Land Records.

20. A certificate of transfer of charge must be signed by the Officers making over and receiving charges. Copies of the certificate of transfer of charge must be sent to the Accountant-General, the Treasury Officer of the District, the Joint Director of Survey and Land Records, the Secretary to the Government in the Revenue Department and to the Chief Secretary to Government, Public (Civil-list) Department.

A certificate regarding taking charge of the confidential file and other necessary information connected therewith should also be appended in the certificate of transfer of charge.

21. The Officer receiving charge must also send to the Accountant-General and to the Joint Director of Survey and Land Records two statements one for the amount of permanent advance and other for the amount of temporary advance, for which he becomes responsible.

22. The Survey Unit Officer should spend not less than 15 days a month in camp and inspect field work on at least 10 days.

23. He will submit to the Joint Director of Survey and Land Records at the beginning of each month a diary in Form No. 59 showing how he was employed during the previous month.

24. He will record in the diary, brief notes of inspection showing the nature of work inspected, result of inspection, quality of work, names of subordinates whose work was inspected and inspection reports showing action taken in cases in which work was found bad.

25. Taluk sketches should be maintained showing by different colour washes the progress of survey in field and in office. The sketches should be constantly referred to by the Survey Unit Officer and the progress carefully watched to prevent accumulation of arrears in any one process.

26. The Survey Unit Officer should see that the instructions contained in Appendix XV, regarding the checking of the outturn of surveyors at convenient centres, are systematically carried out between the 1st and 5th of each month and that necessary statements for drawing the pay of the field establishment are furnished to the head quarter office immediately thereafter.

27. The Survey Unit Officer should see that the pay of the establishment is drawn before the 5th of the month following that for which it is due, Pay of the Surveyor and Draftsman should be regulated on the basis of their performence in the succeeding month, following the time honoured departmental practice.

28. At the beginning of each month, the Survey Unit Officer should examine all the office books and note the dates of such examination in the register of office books, Form No. 60. He should also examine, as often as possible, the books maintained by the field Inspector of Survey and Land Records and check his cash balance.

29. The Survey Unit Officer is held personally responsible for any advance he may make which are not specially authorized; he is responsible for public money entrusted to him, and in the event of loss, will have to replace the amount unless he can show that every reasonable precaution was taken for its safe custody.

He should realize that the correct maintenance of his accounts is as important a part of his duties as his executive work, and he is expected to be sufficiently familiar with financial and account rules to keep an adequate check over the Accountant. He cannot plead as an excuse for a financial or account irregularity that he has been misled by the Accountant, as it is for him to see that the Accountant is doing his work properly.

30. He is also responsible for all sums drawn from the temporary floating advance placed to his credit at the treasury. He should satisfy himself that the charges to meet with for which money is drawn from the treasury have been actually incurred. He should also see that cost rate statements are prepared monthly as required by the rules and that there is no delay in the drawal of the necessary contingent bill for the Government's share or in the communications to the Collector.

31. The Survey Unit Officer should see that all his subordinates are acquainted with the Government Servants Conduct Rules.

32. Whenever a charge is brought against a subordinate, the rules prescribed in the Civil Service (Classification Control and Appeal) Rules and the instructions given by the Government on the subject from time to time should be strictly followed.

Only the authority competent to impose penalties as laid down in Rule 14 of the Civil Service (Classification, Control and Appeal) Rules can impose punishment on subordinates. In cases where the Survey Unit Officer is not competent to impose the penalty, he will complete the preliminary enquiry and bring the allegations to the form of definite charges and call for the explanation of the individuals after giving reasonable opportunity and submit the records to the Joint Director of Survey and Land Records for further action. In all other cases, he will pass orders and keep the records ready for submission to the Joint Director or other competent authority, in the case of appeal. The subordinates affected by the decision are entitled to get a copy of the decision and of other papers bearing in the case and referred to in the decision.

33. When a suit is instituted in a Civil Court against an Officer for acts done in his official capacity the fact must immediately be reported to the Joint Director of Survey and Land Records with a copy of the plaint and a draft of the answer or statement proposed to be filed, the date for hearing must also be reported. Great care must be taken in framing the reply to the plaint. The Officer who prepares it is responsible for its correctness, and for seeing that the statements contained in it are capable of proof. Every allegation made in the plaint, which is not traversed by the defendant, is treated as admitted by him. Each allegation should be distinctly replied to, those strictly correct admitted, and in reply to those wholly or in part incorrect, the real circumstances should be fully stated, showing how much is not true, and referring where there is cumentary evidence, to the particular document. The sanction of the Board will be obtained by the Joint Director of Survey and Land Records for the defence of the suit. As soon as a case is disposed of by the Court, a copy of the decree should be sent to the Joint Director of Survey and Land Records, with a report on the desirability of appeal, if necessary.

34. Subordinates must not be allowed to retire as an invalid on the grounds of ill health or of physical incompetence without a certificate of physical unfitness for duty signed by a District Medical Officer.

35. No subordinate should be retained in service beyond the date of superannuation. However, a Government Servant under suspension on a charge of misconduct should not be required or permitted to retire on his reaching the date of compulsory retirement but should be retained in service until the enquiry into the charge is concluded and a final order passed thereon by the competent authority.

36. The personal files of the N.G.G. Officers for the period before the date of abolition of the system of maintaining Personal files should be kept in the custody of the appointing authorities and they need not follow the officers as and when the non-gazetted officers are transferred to new stations. [Government Memo. No. 30362|72-1 Public (Sections-J), dated 22nd February 1973].

37. The Deputy Director of Survey and Land Records in-charge of the Central Survey Office or the District Survey Units, as the case may be, is responsible for initiating action in due time about the completion of pension records and documents. As a first step in that direction, he shall prepare separately a list of Gazetted Officers and one of non-gazetted officers who will attain the age of superannuation twelve to eighteen months hence. The lists shall be prepared every six months, i.e., on the 1st January and 1st July. The attention of every Government servant whose name is included in the list shall be drawn to the provisions of the Articles 907 to 911 of the Civil Service Regulations, and he shall be advised to make a formal application for pension at least one year in advance of the date of his anticipated retirement in order to avoid the possibility of any delay in the commencement of his pension. A copy of the list shall also be sent to the Accountant-General, Madras. A copy of the list containing the names of the Gazetted Officers shall be sent by the Board to the Government in the Revenue Department with particulars regarding charges, if any, pending against them and action taken thereon.

38. The Survey Unit Officer should pay particular attention to the proper training of probationary Assistant Directors who may be attached to his Unit. He should see that they undergo the course of instructions prescribed in Appendix XIII. He should inspect their work and instruct them personally as often as possible and satisfy himself that they fully understand the details of each process of survey work. He should submit a report of their qualifications to the Joint Director of Survey and Land Records as soon as their course with the Survey Unit is finished.

39. Vacancies in the lowest category of Field Surveyors should ordinarily be filled up by selection of candidates deputed by the District Employment Exchange, on requisition. The syllabus prescribed for the training to be given to the candidates selected is furnished in Appendix No. XII. The candidates selected will be paid a stipend during the course of training. The candidate will have to execute a bond in the form found in Appendix No. XII and shall have to repay the amount received as stipend, if he does not serve the department for a period of 6 months from the date he is appointed as a Field Surveyor.

40. Vacancies in the lowest category of Junior Draftsmen should be filled up by selection of candidates deputed by the Employment Exchanges, on requisition. The syllabus for the training to be given to the candidates is prescribed in Appendix XII. The candidates selected will, during the period of training be paid the minimum pay of the post. The candidates will have to execute a bond in the form printed in Appendix XII agreeing, to serve the department for six months from the date of completion of the training or in default to refund the total amount received as pay and allowances during the period of training. Every candidate should pass the Revenue Draftsman or Computation Test during the period of probation of 2 years or the extended period of probation of one year thereafter.

41. The Survey Unit Officer should pay particular attention to the registry and disposal of all complaints and appeals preferred under section 11 of the Tamil Nadu Survey and Boundaries Act, 1923.

42. He should himself dispose of all important disputes, as also those in which Government interests are largely involved. As a rule, no complaint or appeal should be allowed to remain undisposed of for more than three months.

43. No work should be undertaken for other departments except with the permission of the Joint Director of Survey and Land Records. The cost of all such work undertaken under orders should be reported to the Joint Director of Survey and Land Records for inter departmental adjustments.

44. Survey Officers while obeying strictly the rules laid down for their guidance should lose no opportunities of explaining to officers of other departments and to ryots the methods and procedure followed during survey. They should especially explain the action that should be taken by those who are dissatisfied with any boundary laid down during the survey and who wish to get it corrected.

45. Applications by private parties for copies of official documents shall be stamped with adhesive court fee stamps of the value of 25 paise. Copies of privileged communicotions should not be granted, nor should copies of orders passed by the Joint Director of Survey and Land Records be granted without his permission.

The procedure laid down in B.S.O. 173 and paras 25 and 144 of the District Office Manual should be followed for the grant of copies of documents, records or sketches.

46. Published survey records should be produced before a Court of Law on receipt of a call from the court. Copies of unpublished records may also be produced if they do not relate to affairs of State. If there is any doubt as to whether a particular document relates to affairs of State or not, the orders of the Joint Director of Survey and

Land Records should be obtained. It is necessary however to make a distinction between unpublished records and unfinished records. Though an official record to wit a map may not have been printed and its copies made available for sale to the public, it can be produced before a Court, if the map has been completed and signed by the Survey Unit Officer. But until the map is signed by the Officer, it is an unfinished record and should not be produced before a Court, as its accuracy cannot be guaranteed. Grant of extracts from survey records to private parties will also be governed by the above rule.

47. Every official paper addressed to the Survey Unit Officer must be opened by himself, except when he has granted special authority to his office Superintendent to open letters during his absence from office. All letters and telegrams addressed by name should be forwarded unopened.

48. Junior Assistants should never be permitted to open letters addressed to the Survey Unit Officer nor to sign any document for him "by order", or otherwise.

49. Petitions must be received whenever and by whomsoever presented. They must be regularly registered and promptly disposed of.

50. The Survey Unit Officer should at the beginning of each year, call for lists of records ripe for destruction at the time and pass such orders thereon as he may deem fit. It will also be his duty to see that his orders are promptly and satisfactorily carried out by the office Superintendent.

51. The rules for the destruction of papers are given in Appendix XXV.

52. The Survey Unit Officer is not however debarred from retaining either permanently or for longer periods than those prescribed in the Appendix, any records included under the class "to be destroyed" which, for any special reasons, he may consider it desirable to preserve. Similarly, records which though included in the first instance under the class "to be retained" are subsequently found to be not very important, may be destroyed by the Survey Unit Officer at his discretion.

INSPECTORS OF SURVEY AND LAND RECORDS.

53. The post of Inspector of Survey and Land Records is the category with Gazetted status to which a subordinate can rise in the department. No one will be promoted to this category unless he had passed the Accounts Test for Executive Officers.

Appointments to this category shall be made by promotion from the category of Head Surveyors or by transfer from the members of the Tamil Nadu Ministerial Services in the Survey and Land Records Department or by direct recruitment, if there are no suitable hands for promotion or transfer.

The State shall be the unit for appointment to this category. The Joint Director of Survey and Land Records shall maintain a list of the members of the service and of the Tamil Nadu Ministerial Service in the Survey and Land Records Department who are qualified and suitable for promotion arranged in the order of merit.

54. The staff employed on Resurvey in the District Survey Units will be placed in the charge of Inspector of Survey and Land Records who will be in-charge of the Section.

55. Each field section is divided into two sub-sections each under the Head Surveyor. Occasionally a Senior Deputy Surveyor may be placed in-charge of a sub-section.

56. Each sub-section is generally divided into four Ranges each under a Deputy Surveyor. Each Deputy Surveyor will have charge of six to seven Field Surveyors.

57. An Inspector of Survey and Land Records may have charge of a boundary demarcation and traverse survey section or a field demarcation and field measurement sections.

HIS CHIEF DUTIES ARE :

58. (1) To see that each surveyor has copies of the rules and circulars issued for his guidance;

(2) to see that his Subordinates do a fair amount of work and that the work is of good quality;

(3) to see that the estimated monthly outturn required to the annual forecast is secured;

(4) to bring to the notice of the Survey Unit Officer all instances of idleness, bad or dishonest work or misbehaviour on the part of the Subordinates, under his orders ;

(5) to keep the surveyors supplied with work and to arrange the distribution so that the least possible delay may be caused by travelling;

(6) to watch the stone supply so that there may be no delay to work for want of stones and also that there may be no surplus in depots or villages.

(7) to see that the duplicate field measurment books, khandam sketches and location sketches are sent to the special Revenue Officer, if one has been appointed for final check on completion of the Deputy Surveyor's inspection.

(8) to transmit without delay the diaries of surveyors and records of completed work;

(9) to check at each monthly centre the outturn of surveyors, as credited in their diaries with the records, examining the records at the same time to see that they have been prepared properly;

(10) to distribute promptly the pay and allowance due to surveyors and to return unpaid balances and acquittance rolls to head office without delay ;

(11) to submit to the Survey Unit Officer by the 8th of each month, monthly statements of outturn, progress reports, pay complaint and order books ;

(12) to see that the inspections of the Range Deputy Surveyors are completed without delay and that the complete sets of records reach the section office, within a month from the date of completion of work by the Surveyor ;

(13) to see that the finalling of records received in the section office is completed and test corrections, if any, are issued to the field within a fortnight from the date of receipt of records ; and

(14) to see that the corrections sent to the field are received back duly attended to and the corrections also incorporated in the records within the end of the succeeding fortnight.

59. An Inspector of Survey and Land Records can grant casual leave to his subordinates, subject to the general conditions referred to in rule 15.

60. When casual leave is granted a copy of the order should be written in the diary or work report of the subordinate concerned by the Inspector of Survey and Land Records (e.g.) 5|9. The numerator shows the number of days leave granted and the denominator the number of days leave taken during the year including that just granted.

61. A casual leave register should be maintained and all entries in it made personally by the Inspector of Survey and Land Records.

62. The Deputy Surveyor's range should be so formed and the village in which he should encamp so selected that he may be within easy reach of the Surveyors of his range.

63. A competent field surveyor who has passed the Deputy Surveyor's test should be selected in each range as the understudy of the Range Deputy Surveyor.

64. The Inspector of Survey and Land Records should see that the estimated number of stones of different kinds have been supplied and duly passed and that they have been carted to the villages in

accordance with the estimated number required for each village. The survey of no village should be commenced before the stones required are stocked in the village. The Inspector of Survey and Land Records should report to the Survey Unit Officer in time whether the number of stones ordered for each village is likely to exceed or fall short of requirements, in order that surplus stones may be transferred to other villages or orders issued to the contractor to supply more stones. Any delay on the part of the contractor to fulfil the terms of his contract should be promptly brought to the notice of the Survey Unit Officer.

65. The Inspector of Survey and Land Records is expected to devote the greater part of his time to field inspection, to clearing the doubts of surveyors and helping them in their difficulties, and to making arrangements for work where it may be reported to have been delayed owing to the want of co-operation of the Village Officials or land-holders or from any other cause.

66. He should spend not less than 22 days a month in camp and inspect field work on at least 15 days. For every inspection made he should prepare an inspection report in Form No. 34.

67. The Inspector of Survey and Land Records should refer to Chapter XII for detailed instructions regarding inspection of field work. He must understand he is responsible to ensure that the surveys under his control are accurate and have been conducted in accordance with the rules. His inspection should therefore be thorough and searching.

68. Detailed instructions regarding the checking of instruments and maintenance of store accounts and submission of store returns are given in Appendix No. XXIV.

69. Where a field map has not been neatly drawn, or the figures are indistinct and crowded or where it contains too many corrections, the Inspector should have the same neatly copied and attached to the field measurement book in its proper place along with the original map, which should not be removed from the book but should have the word "cancelled" written across it in red ink.

70. Between the first and fifth of each month the Surveyors in each section should be assembled in convenient centres as may be ordered by the Survey Unit Officer where the outturn for the previous month as per diaries should be verified by comparison with the records. Statements showing the outturn and the pay earned and recommended, should be made out in Form No. 61 for each Deputy Surveyor's range and submitted to the Survey Unit Officer for orders. Where, however, as in town surveys, no Surveyors below the grade of Deputy Surveyors are employed and the strength of each section is small, outturn check at centres should be dispensed with, and the outturn statements prepared from the Surveyor's diaries.

71. The distribution of pay to Surveyors in each section should be made after check of records at Centre time.

72. The inspector of Survey and Land Records should write up his diary daily in Form No. 62. The diary for the first term, i.e., from the 1st to 15th of the month should be submitted to the headquarters office on the 18th and the diary for the second term i.e., from the 16th to the end of the month should be submitted on the 3rd of the following month. He should submit along with his diary for the second term the finally inspected records, his monthly tour journals, the monthly tour journals of his Last Grade Government Servants and chainmen with their muster rolls, Inspection reports and a statement of arrears of inspection. If for any valid reason he is not able to submit his diaries along with the inspected records in time, he should submit the journals, etc., of his Last Grade Government Servants and Chairmen to the headquarter's office within the 10th of each month.

73. Petitions regarding pay and measurement allowance should not be accepted from Surveyors on duty. Books should be maintained and Surveyors should write their petitions in these. The books should be submitted to the Survey Unit Officer with the outturn Statements and will be returned in time for the next distribution of pay. On their receipt the signatures of Surveyors should be obtained against the orders passed.

74. The completed records of each Khandam should be carefully examined by the Inspector of Survey and Land Records and the result of his examination recorded in the field final examination report, Form No. 35. The records together with the final examination report should be despatched to the headquarter's office with as little delay as possible.

75. The Inspector of Survey and Land Records should certify in his diary that records of completed Khandams have been despatched to the headquarter's office.

76. The total number of complaints and appeals referred to him, the number disposed of and the balance in hand up to the end of the term for which the diary is submitted, should also be noted in the diary with a certificate that orders on land complaints or appeals disposed of by him have been communicated to the parties.

77. When the work of his section is drawing to a close, the Inspector of Survey and Land Records should report the same to the Survey Unit Officer at least one month in advance and apply for fresh work.

78. The Inspector of Survey and Land Records should write up the cash book daily and maintain the following registers:—

(1) Village war register of progress of work, Form No. 63

(2) Register of outturn and pay of Surveyors, Form No. 58.

(3) Stock book of Stores, Form No. 64.

(4) Individual ledger of instruments, Form No. 111.

(5) Personal Register.

(6) Register of village boundary disputes, Form No. 46.

(7) Register of Field Boundary Disputes, Form No. 47.

(8) Register of appeals on village boundary disputes, Form No. 48.

(9) Register of appeals on field boundary disputes, Form No. 49.

(10) Register of records received from field and sent to Headquarter's Office Form No. 65.

(11) Register of records received and returned, Form No. 66.

(12) Village stone account register.

(13) Casual leave register.

(14) Stamp account register.

(15) Register of accounts for contingent expenditure.

79. An extract from the cash book and contingent account should be sent to the headquarter's office every month along with the diary of Inspector of Survey and Land Records.

80. On the first of each month, each Range Deputy Surveyor will send a nominal roll of the Surveyors in his range, to the Inspector of Survey and Land Records, in Form No. 67. The Inspector of Survey and Land Records should verify the nominal rolls with his distribution list, make the necessary additions and alterations in both and submit the former to the headquarter's Office before the fifth of each month.

81. An Inspector of Survey and Land Records is allowed one Junior Assistant, who copies order, etc., and keeps the registers mentioned above and one stone accountant who will maintain the register of village stone accounts and do such other work as the Inspector of Survey and Land Records may give him. He is also allowed a Draftsman to examine the completed records before they are submitted to the Headquarter's office.

82. The following rules should be followed in the Office of the Inspector of Survey and Land Records :—

(1) All subordinates should write their letters or petition on a quarter sheet foolscap, leaving half margin.

(2) The Inspector of Survey and Land Records should open all letters himself initial each paper and enter the date of receipt. Letters should then be registered by the Junior Assistant and taken to the Inspector of Survey and Land Records who will write his orders in red ink in the margin of the letters in his own hard-writing, adding initials and date if the order is to be translated, or his signature if no translation is necessary.

(3) When the order, or the translation which should be made by the Junior Assistant has been signed by the Inspector of Survey and Land Records, the Junior Assistant should enter an abstract of the order in the last column of the register and return the letter or petition to the writer.

(4) Papers requiring orders of the Survey Unit Officer should be forwarded to the headquarter's office, after making an entry to that effect in the register.

(5) Records should be sent to the headquarter's office with invoices only. No covering letter is required.

(6) Under no circumstances should the Junior Assistant be allowed to open letters addressed to the Inspector of Survey and Land Records or to sign "by order" or otherwise, or conduct correspondence in any way on behalf of the Inspector of Survey and Land Records.

CHAPTER XIX.

DUTIES OF SURVEYORS.

HEAD SURVEYORS.

1. A Head Surveyor will be employed chiefly on any of the following duties :—

(1) Boundary Demarcation Traverse survey.

(2) Disposal of land complaints.

(3) Charge of a sub-section.

(4) Finalling of maps and other records in the headquarter's office.

2. The post of Head Surveyor forms a selection category promotion to which shall be made on ground of merits and ability, Seniority being considered only where merit and ability are approximately equal.

The Joint Director of Survey and Land Records is the appointing authority and the appointment shall be made as follows :—

(i) Promotion from Town, Panchayat, Deputy Surveyors.

(ii) If no qualified and suitable candidate is available for promotion or transfer by direct recruitment.

A Head surveyor shall within the period of probation pass the Head Surveyor and Sub-Assistant's Test.

Direct recruits shall undergo training prescribed in Appendix XII.

3. When employed on boundary demarcation or traverse survey, a Head Surveyor will be guided by the rules in Chapter II and III and should submit his diary in Form No. 69.

4. While engaged as a Survey Officer in the disposal of land complaints, he should follow the instructions contained in Chapter XVII.

5. He should make himself thoroughly acquainted with the provisions of the Tamil Nadu Survey and Boundaries Act, 1923, and of the rules made thereunder, as also of the sections of the Code of Civil Procedure, as far as they apply to the proceedings of Survey Officers *Vide* Appendices Nos. I and X.

6. As a Sub-section Officer-in-charge of field demarcation and field measurement, a Head Surveyor's duties will be almost the same as those of an Inspector of Survey and Land Records or Section Officer.

7. His sub-section being about one-half of the Inspector of Survey and Land Records section, the Head Surveyor should be able to be more in touch with the Deputy and Field Surveyors of his sub-section and to scrutinize their work more closely.

8. For seeing that the Surveyors of his sub-section are well up in the rules laid down for their guidance, for securing from them the required amount of outturn of good quality and for bringing to notice instances of idleness, bad or dishonest work or misbehaviour, the Head Surveyor is even more responsible than the Inspector of Survey and Land Records.

9. The sub-section officer should carefully watch the work of the Range Deputy Surveyors and see that their inspections do not fall into arrears. He should see that a uniform rate of progress is maintained in all ranges and submit proposals to the Section Officer regarding the redistribution of Surveyors among the ranges, whenever necessary.

10. He should spend not less than 22 days a month in camp and inspect field work on at least 18 days. He should examine the work of every surveyor in his sub-section at least once a month. For every inspection made, he should prepare an inspection report in Form No. 34. For detailed instructions regarding inspection of field work, the Head Surveyor should refer to Chapter XII.

11. The Head Surveyors should write up their diaries daily in Form No. 62, and submit them to the Section Officer together with their inspection reports. The diary for the first term of the month should be submitted on the 18th of the month, along with the diaries for the second term should be similarly submitted on the third of the for the second term should be similarly submitted on the third of the following month along with the statement of arrears of inspections in his sub-section, the tour journals and muster rolls of his Last Grade Government Servants and Chainmen for the month.

12. Except distributing pay to Surveyors when ordered ,a sub-section officer will have no cash transactions and he will maintain no cash book.

13 He has hardly any office work to do and will not be allowed to have a Junior Assistant. He can, however, have a Field Surveyor to assist him in the finalling of records, while he is in-charge of a sub-section.

14. The only registers to be maintained by him are—

(1) Village war register of progress of work Form No. 63.

(2) Register of village boundary disputes, Form No. 46.

(3) Register of field boundary disputes, Form No. 47.

15. On the third of each month, the sub-section officer should forward his village war progress register to the section officer for his information and return.

16. The Head Surveyor should see that the records completed by the Surveyors each month are collected at the end of the month and kept with the Deputy Surveyors and that the records finally inspected by the Deputy Surveyor are invariably obtained by himself (the Head Surveyor) during the centre check. He should also verify the stores in the custody of the Field and Deputy Surveyors and report discrepancies, if any, every month. He should take adequate measures to see that the records and stores are kept in safe custody by his Subordinates and bring to the notice of the Inspector of Survey and Land Records, any loss of stores.

DEPUTY SURVEYORS.

17. A Deputy Surveyor will be employed chiefly on any of the following duties :—

(1) Traverse Survey.

(2) Field demarcation and field measurement.

(3) Charge of a Range in Cadastral Surveys.

18. Every Deputy Surveyor should be fully qualified in the above mentioned processes of work and be conversant with the rules and orders bearing on them.

19. Appointment to the Post of a Deputy Surveyor shall be made by promotion from Field Surveyors or if no qualified and suitable candidate is available for such promotion, by direct recruitment. The Survey and Land Rerords Unit will be the Unit for promotion. An individual appointed to the post of a Deputy Surveyor should pass the Deputy Surveyor's test within the period of probation.

20. A Deputy Surveyor will be eligible for promotion to the category of Head Surveyor subject to his having completed his probation in the category to which he was initially appointed.

21. While employed as a Range Deputy Surveyor, his Chief duty will be inspection of field surveyors' work. He should bring to the notice of the sub-section officer every matter of importance, such as delay to work owing to non-attendance of village authorities or land-holders, but he must carefully avoid unnecessary correspondence. His letters should be very brief as well as few in number. They should be written on half margin in quarter sheets of foolscap paper, to allow of the reply being written in the margin.

22. As his range will generally consist of six to eight field surveyors, he should visit each surveyor at least once a fortnight to inspect his work and to assist him if necessary.

23. He should see that the surveyors understand and carry out the rules and turn out the required quantity of work and that the monthly forecast for the range is realized.

24. He should maintain the register of village stone accounts, Form No. 103, report to the Inspector of Survey and Land Records in good time if any further supply is needed and see that the supply is up to the standards prescribed in rules 6 and 7, Chapter I, and not excessive. As soon as the survey of a village is completed, he should close its accounts and obtain from the village munsiff receipts in duplicate for the stones, if any, left in the village and handed over to him. The accounts so completed together with the village munsiff's receipts, if any, should be forwarded to the Unit Office without delay.

25. The Deputy Surveyor will be held primarily responsible for the good quality of the work of all the Field Surveyors of his range. As he will be in constant touch with his men, it should be possible for him to detect bad work and put a stop to it at once. When the work inspected by him is found bad he should submit the inspection report with necessary particulars prescribed in rule 19 of Chapter XII, to the sub-section officer, within 3 days from the date of inspection. If the Deputy Surveyor neglects this most important duty and allows bad work to continue, he will be punished.

26. A Range Deputy Surveyor should not do less than 18 days inspection in a month, and should measure directly or by calculation 58 Kilometres in a month. For every inspection made he should prepare an inspection report in Form No. 34. For detailed instructions regarding inspection of field work, the Deputy Surveyor should refer to Chapter XII.

27. On the 16th of each month the Range Deputy Surveyor should examine the records prepared by his Surveyors and see that any arrears are completed forthwith. On the 30th records should be examined again and the outturn statement, Form No. 61 prepared. The Deputy Surveyor should obtain the original field maps from the Surveyors along with the diaries for each month and keep them in his custody.

28. On both these occasions, and after each inspection if the Surveyor is present, the Range Deputy Surveyor should initial the diary in token of having checked the records and instruments.

29. When the survey of a Khandam is completed, the records should not be allowed to remain with the Field Surveyors, but the

Deputy Surveyor should take charge of there and complote such portion of his inspection as may be necessary to bring it up to the percentage required.

30. A Range Deputy Surveyor will be punished if his inspection falls into arrears, unless the work done by his Surveyors has demanded more than 58 kilometres a month of inspection measurement.

31. The records of Khandams inspected during a term should be submitted with the diary of that term.

32. The Deputy Surveyor should see that his Field Surveyors are kept supplied with sufficient work. Application for fresh work should be made to the sub-section officer atleast two weeks before the probable date of completion of the work in hand.

33. The diary, Form No. 62, for the first term should be submitted to the sub-section officer on tne 16th of the month, and the diary for the second term on the 1st of the following month.

34. The Deputy Surveyor should certify on the front page of his diary that the records of completed khandams to be specified have been submitted to the sub-section officer.

35. Along with his diary for each term, the Deputy Surveyor should send his inspection reports to the sub-section officer. He should also forward to the sub-section officer the diaries of his Field Surveyors with such remarks as he may consider necessary, along with the diaries for the second term he should submit a statement of arrears of inspection in his range, furnishing particulars of Khandams pending under inspection.

36. On the first of each month, the Deputy Surveyor should submit to the section officer, a nominal roll in Form No. 67, for the men in his range, sending at the same time a copy of the roll to the sub-section officer. Two copies of the outturn statement, Form No. 61, should also be submitted to the sub-section Officer.

37. The Deputy Surveyor should maintain a village war register of progress of work in Form No. 63, and submit it on the 1st of each month to the sub-section officer for his information and return.

38. Range Deputy Surveyor must take up the centre check on the evening of the last day of the month and complete the check of all Surveyors in his range on the 1st of each month. At the time of centre check he should prepare the nominal roll of the Surveyors under his control in survey Form No. 67. He should specify on the diaries of the Surveyors as to whether they attended centre check with complete set of records in time.

39. Whenever a Surveyor proceeds on leave, the Range Deputy Surveyor should receive the records and stores in the custody of the Surveyor.

FIELD SURVEYORS.

40. A Field Surveyor will be employed on boundary demarcation, traverse survey, field demarcation or field measurement.

41. Every Field Surveyor should be fully qualified in the above mentioned processes of work and be conversant with the rules and orders bearing on them.

42. Appointment to the post of Field Surveyors shall be made by direct recruitment. The candidate appointed shall undergo training for a period of 2 months as per the syllabus in Appendix No. XII. He should execute a bond in the prescribed form agreeing to serve the department for a period of 6 months after the completion of the training or in default to refund to the Government the amount received as a stipend during the period of training.

43. A Field Surveyor promoted to the category of a Deputy Surveyor will have to pass the Deputy Surveyor's Test within 2 years from the date of promotion.

44. When the Field Surveyor goes to a village, he should take with him his credential, Form No. 7, and cause his arrival in the village to be notified by beat of drum. He should have the contents of the information in Survey Form No. 9 published in the village and explain to the ryots on the date at the hour and place fixed, the procedure that will be adopted for the survey, etc., as instructed in rule 3 of Chapter II.

45. He should serve the village authorities and land-holders with notices in Forms Nos. 8 and 9, before commencing work.

46. When the village authorities or landholders fail to attend and render the necessary assistance to survey work, a report of non-attendance, should be sent to the Range Deputy Surveyor.

47. The Field Surveyor should obtain the required number of demarcation stones from the village Munsiff by giving indents in survey Form No. 3. He should enter in his stone account in Form No. 5 the date of his indent, the date of receipt and the number of stones received in each class and size of stones.

48. If stones have not been stocked, or their number is so small as to cause delay to his work, he should report the same at once to the seition offiier through the Range Deputy Surveyor.

49. As the work proceeds in the village fresh indents for stones should be submitted from time to time to the Range Deputy Surveyor and accounts of receipt and expenditure maintained Khandamwar in Form No. 5.

50. When demarcating with stones, he should not use unpassed stones, or stones which are not of the proper size or on which the distinguishing marks have not been cut. He should see that every stone is firmly embedded in the ground.

51. He should not commence the measurement of any field before all the stones on its boundary have been planted, and the 'S' or St. George's Cross marks are cut wherever necessary.

52. The detailed instructions on chain measurement contained in Chapter XXIV Survey Instruments, should be rigidly followed. The Field Surveyor should himself follow the chain, count the number of arrows and read the chain before recording any measurement. These duties should never be left to measures.

53. Before beginning his work daily, he should carefully test his chain in the manner explained in Chapter XXIV. Unless his chain is correct, his measurement will not be accurate.

54. The measurements made by the Field Surveyor for each field should be sufficient to plot it independently.

55. In measuring the common boundary between two fields, the field surveyor should take his measurements not only to the sub-division points of the field first taken up for measurement, but also to the sub-division points, if any, of the adjoining field, so that it should not be necessary for him to remeasure the boundary when the adjoining field is taken up for measurement. Particular attention should be paid to this rule as this is the only means of preventing different measurement being recorded for the same line in adjoining fields.

56. When the scale of the area square paper used for computing areas differs from the scale on which the field map is plotted, the Field Surveyor should be careful to record the correct area which is obtained by multiplying the computed area by the square of the proportion of the scales.

57. The area computed by the Field Surveyor will be used for recording his outturn in his diary and in the outturn statement prepared monthly by the Range Deputy Surveyor. If, on verification, it is found that the Surveyor has computed his areas indifferently, he will be punished.

58. As each field map is completed, the Field Surveyor should attest his signature with date at the lower right hand corner of the map.

59. He should bear in mind that neat execution in the drawing and inking of the field maps is as important as good and accurate field work. If a map is rendered untidy by corrections or other causes, it should be reprepared.

60. Where the field register is not written by him, he should verify each entry on the ground and note the discrepancies, if any, in a discrepancy list, and forward the same to his Range Deputy Surveyor for orders.

61. The Field Surveyor should see that all sub-divisions shown in the field register have been measured by him and that additions or omissions, if any, are noted in the discrepancy list.

62. As soon as the measurement of each Khandam is completed, the Field Surveyor should compare the side field boundaries, and immediately thereafter send all the records relating to the Khandam to the Range Deputy Surveyor, together with a list of fields not measured for the reason that they do not admit of chain triangulation.

63. Application for fresh work should be made in time to prevent any delay. If this is not done, the Field Surveyor will be held responsible for the time wasted.

64. The Field Surveyor should keep a diary in Form No. 70 and write it up daily. A copy should be submitted to the Range Deputy Surveyor twice a month, on the 1st and 16th. The headings of the diary must be studied properly and the instructions regarding entries carefully observed.

65. His outturn for the month may be disallowed for the time unless his records are up to date on centre day. Records should therefore be prepared completely from day to day as far as possible.

66. A carefully preserved file should be maintained of all circulars and orders of a permanent nature bearing on the conduct of work.

67. The Field Surveyor should not leave his village except with the written permission of his superiors.

68. When a Surveyor proceeds on casual leave or any other kind of leave he should handover to the Range Deputy Surveyor, before availing himself of the leave, all the stores and Government records in his custody, along with the complete set of records prepared by him for the work done by him up-to-date.

CHAPTER XX.

OFFICE ROUTINE.

Superintendent.

1. A Superintendent in the Ministerial Service will be in the immediate charge of the Survey Unit Office and assist the Deputy|Assistant Director.

2. He is responsible for the order and discipline of the Office, for the punctual submission of returns and for the prompt and careful despatch of business.

3. In the absence of the Deputy|Assistant Director of Survey from headquarters, the Superintendent will, with the permission of the Deputy|Assistant Director of Survey open all Official letters and telegrams (except those addressed by name) and will attend to all routine matters. He will on such occasions sign for the Deputy|Assistant Director of Survey.

4. He will see that every paper is stamped with the date seal and registered as soon as received in office.

5. The Superintendent should see that the instructions in the District Office Manual in regard to the form of correspondence are followed in the Office.

6. The Superintendent will see that every person leaving office on duty takes with him written orders and is furnished with all necessary records, instruments, etc.

7. During the absence of the Deputy|Assistant Director of Survey on circuit the Superintendent will daily initial every entry in the cash, contingent, travelling allowance and advance books.

8. He will send a daily report in Form 77 to the Deputy|Assistant Director of survey.

9. He will examine and initial all bills for payment, pay abstracts and returns before they are submitted to the Deputy|Assistant Director of Survey for signature.

10. He will periodically examine all the Office books and maintain the register of office books Form No. 60 entering there in the dates of such examination. He should see that the name of the person responsible for the upkeep of each book is noted in the printed slip to be pasted on the inner page of the cover of the book.

11. He will also at the beginning of each year have a complete list of records ripe for destruction prepared by the sections concerned and submit it after a thorough scrutiny to the Deputy|Assistant Director wtih his remarks.

12. On receipt of the lists with orders of the Deputy|Assistant Director, he will have the records ordered for destruction brought before him, and after satisfying himself that no records not ordered for destruction had been included in them, get them burnt or otherwise destroyed in his presence.

13. A register of probationers in Office should be kept and the progress made by them examined from time to time.

14. In emergent cases, the Superintendent can in the absence of the Deputy|Assistant Director on tour, and pending his approval grant casual and optional leave subject to the conditions governing the grant of such leave.

15. When the processing of records has been completed appreciably either an Inspector of Survey and Land Records or a District Surveyor will be deputed to supervise the work in the Technical Section. When no one is so deputed the Superintendent of the Office will attend to the duties of the Technical Manager specified in the rules below: The Technical Manager should maintain a diary in Form No. 85 for work done by himself and submit on the first day of each month a copy thereof to the Deputy|Assistant Director.

16. The Superintendent's chief duty is, however, to supervise the work of the Computor-Draftsmen in Office. Just as the Inspector of Survey and Land Records in field is responsible for the distribution of work to the Surveyors in his section and for the quantity and quality of their work, the Superintendent is responsible for the distribution of work to Computor-Draftsman and for the quantity and quality of their work.

17. A Computor-Draftsman should pass the Revenue Draftsman's test or Computation test, within the prescribed period of probation or the extended period of probation as the case may be as required in the special rules for the Survey and Land Records Subordinate Service.

18. The work of Computor-Draftsmen comprises four processes, viz., C—Traverse computation, D—Traverse plotting, G—Plotting Village Map, and H—Finishing Village map and area computation. These processes consist of several sub-processes as shown in Appendix XVI in which also is given the standard daily outturn expected in each sub-process.

19. The establishment employed on processes of work, as distinguishtd from correspondence, accounts, etc., should be divided into four sub-sections as shown below :—

(1) C.P.—Traverse computation.

(2) G.—Plotting.

(3) A.R.—Area computation.

(4) P.R.—Printing and finishing.

20 There are generally in each Unit not less than two Senior-Computor Draftsmen well conversant with traverse computation. One of them will be in charge of the C.P. Sub-section and will be styled Head-Computor. Another Senior Computor Draftsman styled as Head-draftsman will supervise the G ; A.R. and P.R. sub-sections each having as sub-head an experienced Computor-draftsman

21. As it is essential that processes C and D should be well ahead of processes G and H, the Head-Computor should have a sufficient number of traverses computed at least one month before traverse plotting commences, so that the Head-Draftsman may have the skeleton plots on scale 1 m.m. : 5000 m.m. (16 inches to a mile) ready before the field plotting commences.

22. The chief duty of the person in charge of the G sub-section will be to examine the plotting of fields with reference to the lists of discrepancies prepared by the Draftsman in Forms Nos. 22 and 23 and correctly locate the errors, if any, and report whether the errors can be adjusted in office in the manner explained in Chapter VIII.

23. The list of errors will be further examined by the Head Draftsman and submitted through the Superintendent to the Deputy| Assistant Director for orders. If the Deputy|Assistant Director is not at headquarters, the Superintendent will pass the orders himself and submit the list to the Deputy|Assistant Director for approval. When the processing of records has been completed appreciably either an Inspector of Survey and Land Records or a Head Surveyor working in the field will be deputed to supervise the work in the Technical Section.

24. In regard to all traverse and area computations, the principles to be kept in view are that each computation should be performed independently, that one computation should be under lock and key, while another is being performed, and that only the comparer should have access to more than one computation sheet. The Superintendent should see that these instructions are rigidly followed by the Head Computor.

25. Whenever enlargements or reductions have to be made by the pantagraph, the Superintendent should insist on the Drafts-

man first drawing squares as explained under the head, pantagraph in Chapter XXIV survey instruments.

26. Particular attention should be paid to the style of drawing of maps, the typing of field numbers and the printing of names.

27. The following registers will be maintained under the immediate supervision of the Superintendent, Nos. 1, 9 and 10 by the Record-keeper, No. 5 by the Head-Draftsman and the remaining 6 registers, by the Draftsman attached to the Superintendent:—

(1) Progress register of area measured in field and of records received in office, Form No. 71.

(2) Monthly abstract statement of outturn of Computor-Draftsmen, Form No. 72-A.

(3) Village war register of outturn of Computor-Draftsmen Form No. 73.

(4) Register of miscellaneous items of work Form No. 74.

(5) Sub-Section progress register of process G and H. Form No. 75 and 75-A.

(6) Progress register by Processes, Form No. 76.

(7) Daily abstract of progress of sub-processes, Form No. 77.

(8) Register of persons responsible for each sub-processes, Form No. 78.

(9) Register of inspection of field work, Form No. 79.

(10) Quarterly return of inspection of field work, Form No. 80.

28. Every endeavour should be made to reduce miscellaneous items of work. The number of days allowed under this head represents the time for which payment is made although it does not contribute to a direct return in Square Kilometres (Square Miles). These items of work should receive the special attention of the Superintendent. The more important portion of this work such as (1) examining sketches of replaced missing stations and altering traverse records, (2) examining khandam sketches and making out a list of fields (not dealt with in supplemental survey) in which the discrepancies in original survey measurements are such as to affect the original survey areas and necessitate recomputation, (3) correcting records as per decisions on land complaints, (4) attending to corrections in measurements areas, etc., pointed out by the Settlement and other Departments, should be done by the persons in charge of the four Sub-section; C.P., G., A.R. and P.R., and by the Head-Computor and Head-Draftsman.

For attending to items, such as the following, two or three persons as may be necessary should be solely employed and the Superintendent should see that when any of them has not sufficient work, he is at once given regular process work :—

(1) Preparing extracts from traverse field books and traverse sheets.

(2) Correcting field numbers when villages are amalgamated or sub-divided.

(3) Replotting untidy field map or maps which have undergone too many corrections.

(4) Preparing tracings (for incorporation into the field measurement book) from village map for fields, traversed with the theodolite or Stanley's circumferenter and entering angles and distances.

(5) Drawing the scale, north point and the (Acre) Hectare Square and noting the reference numbers in the heading of the village map.

(6) Colouring taluk sketches showing progress of survey and mapping.

29. On the first of each month the Superintendent should submit to the Deputy|Assistant Director an estimate of outturn for the month in Form No. 81. The estimate should show, not only the villages which are expected to be completed in every respect under process G or H, but all the villages in which any sub-process of office work is expected to be done. In fact, the estimate should show how all the Computor-Draftsmen are proposed to be employed during the month. The sufficiency or otherwise of the estimated figures should be carefully scrutinised every month with reference to the forecast for the year.

30. Whenever the Superintendent finds that arrears are accumulating in any sub-section, he should transfer men from other sub-sections in which work may be slack. To this end, every Computor-Draftsman should be trained in all sub-processes of office work.

31. If, during the course of the month it is found that the estimated outturn is not likely to be secured in the village estimated, efforts should be made to obtain the outturn in other villages not originally estimated for completion.

32. The Superintendent should see that the monthly report, Form No. 82 and the list of villages notified under section 13 of the Act Form No. 83, are prepared and submitted to the Deputy|Assistant Director in time to allow for their scrutiny and submission to the Joint Director of Survey and Land Records on the 27th of the month.

33. The area of no village should be taken credit for under process H, until the village has been finally inspected in field by a Gazetted Officer, and the maps and other records have been finally examined in Office by the Head Computor, Head-Draftsman, and Superintendent and signed by the Deputy|Assistant Director.

34. It should be borne in mind that for all maps sent to the Central Survey Office for Publication, there should be a complete record of measurement from which the map can, when necessary, be replotted, and also that the record of measurement contains sufficient measurements to plot each field independently.

35. When an indent is made on the Central Survey Office for records, the purpose for which the records are required should always be noted in the indent. It is not sufficient to say merely that the records are required for reference.

36. Whenever it becomes necessary to correct or alter published records or records once sent to the Central Survey Office and recalled, the corrections or alterations should be carried out in accordance with the instructions contained in Appendix No. XI.

37. In returning such records to the Central Survey Office, they should invariably be accompanied by a memorandum of alterations in Form No. 84, explaining fully the circumstances under which the alteraions had to be made. Memorandum of alterations should always be sent under cover of a letter or docket. Records and maps in which alterations have been made should not be sent with mere invoices.

38. Each Computor-Draftsman should keep a diary in Form No. 72. The diaries of all Computor-Draftsmen will be examined by the Superintendent, who should see that every man has done his day's work and that credit is not taken for work not done.

39. On the 3rd of every month, the Superintendent will submit to the Deputy|Assistant Director the monthly abstract statement of outturn of each Computor-Draftsman showing the pay earned by him and that recommended, and will report to the Deputy|Assistant Director any idleness or irregularity that he may discover.

HEAD CLERK.

40. The Head Clerk is responsible for the correct and prompt registry and safe preservation of all correspondence.

41. When papers have been opened and stamped with the date seal in the presence of the Deputy|Assistant Director or Superintendent, they will be given to the Head Clerk for registry.

42. The Tottenham system as detailed in the District Office Manual should be followed for the conduct of official correspondence. The procedure prescribed for the Revenue Divisional Offices will be adopted.

43. Every paper with the exception of the undermentioned items received in the Unit Office should be machine-numbered and entered in the Distribution Register :—

(i) Bills, Cheques etc.

(ii) Vouchers for travelling allowance bills, contingent bills, etc.

(iii) Acknowledgments receipts and invoices.

(iv) Acquittance rolls.

44. The following registers are to be maintained in a Survey Unit Office :—

(*a*) Distribution Register.

(*b*) Personal and Periodical Registers.

(*c*) Fair copy register and despatch register.

(*d*) Call Book.

(*e*) Stamp account.

(*f*) Security Register.

(*g*) Record issue Register.

(*h*) Copy application Register.

(*i*) Petition Register.

(*j*) Arrear lists.

(*k*) Consolidated periodical Register.

(*l*) Register showing the registered articles received and sent.

(*m*) Register showing the Express Delivery letters and telegrams sent.

(*n*) Validation Register.

(*o*) Registers of land Complaints and appeals on field and village boundaries, and other registers detailed under this relevant sections.

45. As soon as the papers received have been numbered, they should be entered in the distribution register and distributed to the staff concerned to whom the currents are marked by the Deputy| Assistant Director or the Superintendent.

46. The procedure detailed in the District Office Manual in regard to the procedure for dealing with correspondence and their disposal will be followed.

47. On Court Fee lables attached to petitions or appeals properly stamped, the date stamp should be applied in such a manner as to cover or touch some part of the stamps, but not in such a way as to obliterate the entries thereon or to render the detection of forgery easy. The stamps should then be cancelled by punching the figure head with a circular punch.

If the petitions or appeals are insufficiently stamped, the date stamp should not be applied to the stamps, on it, nor should the stamps be cancelled by punching out the figure head. They should be returned to the parties for resubmission, properly stamped.

Stamps affixed to the petitions in excess of legal requirements should be punched. No refund or renewal can be granted where the amount of the excess value is less than a rupee. In cases where the value of the excess stamps is not less than one rupee, the party concerned will be allowed refund of their value after deducting the prescribed amount. The party should be given a certificate in the first portion of the Form R.F. XXX-87 and an advice in the second portion of the Form, sent to the Treasury Officer. Stamps themselves should on no account, be removed from the petitions and returned to the parties.

48. Every clerk who submits for orders a document bearing a court fee adhesive stamp is responsible for seeing that it has been duly punched and any Junior Assistant or Assistant submitting a document bearing an unpunched adhesive stamp will be required to pay the value of the stamp and is also liable for suitable punishment.

This does not, however, absolve either the Officer opening the tapals or the Heads of Sections from their responsibility for seeing that stamps are punched.

49. When the papers have been finally disposed of, the section heads should mark the nature of disposal for each file. The files with the index slips in the case of R. & D. disposals will then be handed over for preservation in the Record Room. On receipt of files in the record room, the second punching with the diamond punch on the court fee adhesive labels available in the files should be made before the files are kept in the record bundle.

50. Whenever an old disposal is issued to any Clerk on receipt of requisition slips specifying the purpose for which it is required, necessary entries should be made in the record issue register in Form No. XIV of Appendix B of the District Office Manual and the acknowledgment of the Assistant or Junior Assistant obtained in the register. When the record keeper receives the records back, their receipt should be duly entered in the record issue register and the requisition slip should be returned to the Assistant or Junior

Assistant. The records should be returned simultaneously when the current for which they were taken are disposed of.

51. The official designation of the Deputy|Assistant Director should be set out at the head of every letter, docket or memorandum issued by him or from his office on his responsibility, irrespective of any signature which may be given by procuration at the end and irrespective of the authority or person to whom it may be sent.

52. Separate letters must be written on distinct subjects and paragraphs numbered.

53. Any previous correspondence on the same subject as that discussed in a letter must be quoted by date and number.

The instructions in paragraph 50 of the District Office Manual with regard to quoting references in the Drafts should be followed.

54. Demi-Official correspondence and verbal communications should not be quoted in official correspondence. A full and accurate record of the instructions given should be kept in the connecting files. Such record should be made as soon as possible after the instructions are given and should form a part of the connecting papers so as to be available for reference and information at any later date.

Where oral instructions are of such a nature that they have to be implemented straightaway, the officer concerned may take action accordingly, but should submit a detailed report as early as possible to the competent authority for confirmation through the appropriate official Channels. If however, such oral instructions do not require any immediate action and involve policy or expenditure, the Officer who receives such instructions should obtain formal written orders from the competent authority confirming the instructions before carrying out the same.

55. The enclosures should be arranged in chronological order. They must bear the number and date of the covering letter. Each enclosure should also bear a separate sub-number. There may be cases in which the enclosures are too numerous or too heavy to be conveniently attached to the covering letter. They should then be sent in a separate stitch along with the letter.

56. Enclosures may often be forwarded in original, to be returned when no longer required. They should not be forwarded when extracts will suffice.

57. Copies of enclosures to letters need not be kept except in very important cases.

58. Every paper should bear the initials of the copyist, the comparer and the head clerk before it is taken to the Deputy|Assistant Director of Survey for signature.

59. Reports of the Office Superintendent requiring information from field can be sent out to field section officers to be returned with replies in the margin. No covering letters need be sent.

60. Short and unimportant communications should be written on blank post cards of the prescribed size instead of on service post cards. If there are other communications to be sent to the addressee on the same day, the unstamped card should be enclosed in the cover containing such communications provided no additional postage is thereby incurred. Otherwise, the card should be stamped with a lable for 15 paise and posted separately.

61. Such cards should invariably be used for intimating that any periodical return is nil.

62. No covering dockets or letters need be sent with periodical returns, maps or records. An acknowledgment receipt, or an invoice, C.F. No. 280, will suffice.

63. If remarks in connection with any of the above documents be necessary, they must form the subject of a separate letter which should quote the number of the acknowledgment receipt or invoice forwarding them.

64. Covers containing official correspondence, which is not of a confidential nature, should be addressed to the officer for whom they are intended, by his official designation only without the addition of his name.

65. Confidential papers should be placed in double covers, the inner cover being sealed, marked "confidential" and superscribed with the name only of the addressee, the outer being addressed in the manner prescribed in the preceding rule. Both covers should be of strong material, the inner envelope being as nearly as may be of the size of the outer one.

66. The weight of covers must be reduced as far as can conveniently be done. For instance, a whole bundle of papers should not be sent when a part will suffice.

67. Letters must be sent by Registered Parcel or by Registered Post only under the specific instructions of the Superintendent who will decide whether they are so important as to be sent by Registered Post or otherwise.

68. All letters sent by Government Officers in their official capacity in reply to communications of any kind received from private individuals or associations should be despatched "Service Paid" Extracts of field map and land registers and unused copy

stamp papers intended to private parties should be sent unstamped and marked "Service Bearing".

69. The acsount of service postage stamps should be made up by the despatching clerk daily. The account will be checked daily by the head clerk and at least once a week by the Superintendent. The Deputy|Assistant Director should also check the account as often as possible.

70. Address written on the covers should be complete with the name of the post office of delivery clearly noted. Intimation of number of sheets or the fees in cash so calculated shall be given to the applicants by "Service Bearing Post".

71. All covers sent by post should be franked by the Head Clerk or by the despatching clerk with full signature and date.

72. Urgent telegrams should not be sent except when an ordinary or deferred message would cause delay or inconvenience; and no telegrams should be sent at all when an urgent letter would suffice. The cost of unnecessary telegrams or telegrams due to neglect on the part of subordinates to send indents or apply for information in time will be recovered from the persons responsible.

73. Immediately a telegram is despatched, a post copy should be sent.

74. The Head Clerk will keep an order book in Form No. 87 in which all orders of the Deputy|Assistant Director, verbal or written should be entered. Each order must be initialled by the Head Clerk and the book must be taken to the Superintendent and the Deputy|Assistant Director daily for initials.

75. There should be no delay in communicating orders to the parties concerned. The Head Clerk will be held responsible for this.

76. The Heads of sub-sections in the Unit Office will maintain a Remembrance note book in which entries are made of all the orders of the Deputy|Assistant Director. The Sub-section Head will watch and take action on the orders as quickly as possible. The Deputy|Assistant Director himself must maintain a separate Remembrancer to watch action on all matters of urgency and importance.

77. Opposite to each order, the action taken and the date should be entered. It is not sufficient to say "noted" under column, "action taken", e.g., if the order is one of fine or suspension, the acquittance roll in which the fine has been recovered or the bill in which the stoppage has been made should be noted. If an order has been communicated to field, the number and date of the communication should be noted.

78. On the 1st of each month, a statement showing the orders remaining to be complied with on that date should be submitted to the Deputy|Assistant Director for orders.

79. The Head Clerk will maintain the special Registers (One for communications from higher authorities and the other one in respect of references from other officers and subordinates) of all D.O. letters, or important Communications requiring replies to be sent within a specified date in Form No. XVI in the District Office Manual Appendix XIII. This should be maintained by the Head Clerk under the personal supervision of the Superintendent, who should personally see that replies to such references and reminders are sent then and there promptly. It should be submitted to the Deputy|Assistant Director daily for his perusal if he is at Head-quarters.

80. The instructions in the District Office Manual (Chapter XV) in regard to the issue of reminders and prevention and checking of arrears and delays should be strictly followed.

81. The rules and instructions in the Government Servants' conduct rules in regard to the acquisition or relinquishment of properties should be strictly adhered to and the annual statements required should be obtained and recorded.

82. The Head Clerk will keep the four registers described in rule 10, Chapter XVII, for village and field boundary disputes and appeals. He should bring to the notice of the Deputy|Assistant Director whether any files of land complaints or appeals shown in the diaries of Survey Officers as having been despatched to the headquarter's office have not been received.

83. A return of boundary disputes should be submitted to the Joint Director of Survey and Land Records monthly in Form No. 88.

84. On completion of the survey of each taluk, all papers connected with boundary disputes should be sent to the Central Survey Office with a list in Form No. 57.

85. The spelling of proper names of places should be as in the alphabetical lists of villages in the Tamil Nadu State.

86. In all official correspondence, officers and the public should be addressed with the prefix, Thiru, Thirumathi or Selvi as the case may be.

HEAD ACCOUNTANT.

87. The Head Accountant will be in immediate charge of the account section. He will prepare pay, contingent and travelling allowance bills, and have custody of Government money.

88. He must be well acquainted with the Service rules, Fundamental rules, and the Tamil Nadu Pension, Financial, Account and Treasury Code.

89. The Head Accountant is required to deposit as security Rs. 350 in cash and execute a bond before he is placed in charge of the post. The amount will be refunded to him after six months from the date of vacation of office; but the security bond shall be retained permanently or until it is found by the Deputy|Assistant Director that there is no further necessity for keeping it. The deposits may be made in suitable instalments, if necessary and the provisions of articles 285, 286 and 287 of the Madras Financial Code may be followed at the time of transfer or refund of deposit.

90. The following are the books and registers to be kept by him :—

(1) Cash Book (C.F. 119 A)

(2) Advance Book

(3) Contingent Register (C.F. 119)

(4) Register of Travelling Allowance of Gazetted Officers (T and A 9).

(5) Register of travelling allowance of establishment (T and A 15 B).

(6) Rough Pay bill of Office establishment (T and A 11 B).

(7) Rough Pay bill of field establishment (T and A 11 B).

(8) Field acquittance roll (Form No. 89).

(9) Register of acquittance rolls (Form No. 90).

(10) Pay distribution book (Form No. 91).

(11) Register of bills sent (Form No. 92).

(12) Daily contents of cash chest (Form No. 93).

(13) Register of leave granted.

(14) Register of tenders (M.F.C. No. 25).

(15) Register of contracts and agreements (Form No. 26).

(16) Register of permanent advance (C.F. 117 A).

(17) Register of undisbursed pay and allowance (C.F 119 B).

(18) Register to watch double claims of T.A.

91. The calendar of returns appendix XXVII shows the returns for which the oead Accountant is responsible and the date on which they should reach the Joint Director of Survey and Land Records

The most important of these is the return of expenditure in Form No. 95 which should be prepared in accordance with the instructions contained in Appendix XVIII.

92. There will be one cash book for all the transactions connected with pay, travelling allowance, contingent expenses from permanent advance and payment of cooly bills separate accounts should however be kept for pay, travelling allowance, contingencies and temporary advances, sanctioned to meet the cost of Boundary Pillars and hired labour.

93. All receipts and disbursements, whether relating to pay, travelling allowance, contingencies, advances or otherwise, should be entered in the cash book daily with corresponding entries in the subsidiary registers concerned.

94. Every entry in the cash book must have a separate number assigned to it to facilitate easy reference.

95. The entries should give particulars of receipts or disbursements with indication of the corresponding entries, in different books or registers such as the register of bills received and sent, advance book, contingent register, etc.

96. Every entry in the cash book must be capable of being traced to its source. The same figures must be found elsewhere. For example, in support of an entry of Rs. 121.50 it is not sufficient to refer Rs. 120 in one place and Rs. 1.50 in another, unless these figures are shown separately in the cash book.

97. Every item of charge should be supported by a voucher and should be passed by the Deputy|Assistant Director or by an Officer. The vouchers should be generally in English and in Form No. 96.

98. Even in the case of petty disbursements, it is not necessary that a receipt should be obtained from the person to whom the money is actually disbursed.

99. All vouchers must be filled in and signed in ink. The amount of each voucher should be entered in words as well as in figures. Care must be taken not to leave space for fraudulent alterations before or after either entry. The form for stating an amount in words should be "Rupees only" or "Rupees .... paise" the written amount should fill the whole space between "Rupees" and "only" or 'paise' All corrections and alterations in a voucher should be attested by the initials of the person signing the receipt. No document bearing an erasure can be accepted. If any correction be necessary, the incorrect entry should be cancelled neatly in red ink and the correct entry interlined. The Deputy|Assistant Director or Superintendent as the case may be should set his initials to each such corrections in

authentication. When the payee signs in a vernacular, he should be required to note the amount acknowledged in the vernaculars in his own handwriting. Payments to or recoveries from Government servants on account of pay, leave salary or travelling allowance should be made and calculations made to the nearest multiple of five paise and where the equivalent value is midway between two multiples the lower multiple.

100. Payments on account of contingencies should be entered in the contingent register. The amount supported by each voucher should form a separate entry thus :—

	Rs. p.
Voucher No. 1.	150—00
2.	2—55

It is not correct to make this entry thus

vouchers Nos. 1 & 2	152—55

101. Although there should be a separate entry in the contingent register for each voucher, separate payment need not be made for each voucher nor separate entry made in the cash book. All pay ments on account of contingencies, etc., will be totalled up for each day of payment in the contingent register and the total amount entered in the cash book on the same day, quoting the number of the entry in the contingent register.

102. Charges on account of bearing postage must be supported by the cover or addressed slips having the postal stamp indicating the amount due, affixed in it and duly passed by the Deputy|Assistant Director.

103. A miscellaneous payments register must be kept in Form No. 98. The amounts received should be debited each day to the cash book and the cash book entry numbers shown. Payments to treasury and refunds to parties should be shown under expenditure, with the cash book entry numbers. The account should be balanced every month.

104. Advances of pay and travelling allowance on transfer and advances for travelling allowances on tour drawn for subordinates should be entered in the Cash book and the respective registers for watching recoveries of the advances drawn and paid.

105. Recoveries of advances should also be noted both in the advance book and in the cash book.

106. It will be found convenient to make a floating advance of Rs. 30 to the storekeeper and Rs. 5 to the daffadar to make the necessary small purchases or to pay for telegrams, bearing covers carriage of records, etc.

107. Whenever the Deputy|Assistant Director goes on tour, an advance should also be made to the camp clerk to meet contingent expenses.

108. When these floating advances are exhausted or nearly so, the persons concerned will forward the vouchers to the head accountant, who will pay the amount of the vouchers after making the necessary entries in the contingent register. The payment thus made will be in recoupment of the floating advances, not in adjustment of them.

109. No charge, for which sanction is necessary, may be incurred before sanction has been received. A copy of the order of sanction should be enclosed with the bill.

110. As far as possible, all charges must be paid during the month in which they are incurred. In excepted cases, valid reasons must be given.

111. Once a month or often, if necessary, the entries in the several columns of the contingent register should be added up and the several totals posted in an abstract bill of contingent charges which should be presented for payment at the Treasury. It is important that the sub-vouchers should be "cancelled" cancelled in such a manner, that they cannot be subsequently used fradulently. Care should, therefore, be taken to see that barring those required to be submitted to the Audit Officer, the other sub-vouchers are so cancelled that they cannot be used again. An extract of the contingent register should be enclosed with the Bills presented for payment at the treasury.

112. A rough pay bill will be prepared, in the first instance for office and field establishments separately. After careful examination, the entries will be copied into the fair pay bill.

113. The Head Accountant will receive from the Head Clerk the field and office order books on the 12th and 23rd of each month. These will show the cash recoveries to be effected. Against each item in the order book, the Accountant should enter the number and date of the pay bill in which the recovery has been made and attest the entry.

When the recoveries towards cost of correction or revision work or cost of stores lost could not be made by deduction in the pay bills, they should be recovered by transfer credit to cash recoveries in the Acquittance Rolls. The connected item number in the Register of Miscellaneous Payments with date should be noted in the order Books. If any recoveries (Pay and M.A.) for cost of stores, etc., are effected from the other Survey Units, they should be credited to Register of Miscellaneous payments.

114. On receipt of the nominal rolls and outturn statements from field, action will be taken to regulate the pay of the staff on

the basis of the outturn realised and number of days pay passed in the work reports.

115. In preparing pay bills of office and field establishments, they should be classified into sections categorywise.

116. Separate bills should be prepared for permanent and temporary establishments, the word "permanent" or "temporary" as the case may be, being typed in red at the top of the bill. An absentee statement should also be prepared in the prescribed form whenever necessary.

117. Field acquittance rolls will be prepared in Form No. 89 along with the rough and fair copy pay bills of field establishment, Travelling allowance and other miscellaneous bills. These rolls will be numbered and registered. When any deduction has been made from any individuals salary, the number and date of the order book entry should be written against the item in the roll.

118. The pay of the office and field establishment should be drawn on the first working day of the month following that for which it is due.

119. Pay will be distributed to the Office establishment in the presence of the Deputy|Assistant Director or the Superintendent.

120. Remittances on account of pay and allowance of field establishment will be made by the Deputy|Assistant Director to the Section Officer by Government Bank Drafts or Reserve Bank of India remittances.

121. Applications for Government bank drafts will be made to the Agent of the State Bank or to the Treasury Officer, if it is not a banking treasury.

122. Government Bank Drafts received from outside offices are noted in the Register of Cheques received. Cheques or cash received from the Treasury should be noted in the R.C.R. The total of the Government Bank Draft, cheques and cash for each day should be brought to the cash book. When the bill, cheque or cash is sent to outside offices, this should be brought to the Register of Bills sent. When cash towards contingencies is sent to the Inspector of Survey and Land Records, the Head Surveyor or Section Officer, it should be noted in the Register of Bills sent (contingencies).

123. A form of printed receipt must accompany every remittance to be signed and returned by the Officer to whom the money is sent. These receipts must be regularly numbered and filed.

124. When acquittance rolls are returned to office after distribution of pay, they must be carefully examined by the head accountant, who will see :—

(1) that receipt stamps have been affixed in the case of all payments in excess of Rs. 20.

(2) that the thumb impression of each individual who cannot write has been obtained and the same attested by the paying officer;

(3) that the dates of payment have been filled in ;

(4) that the reason of non-payment is given opposite the name of each individual who has not been paid;

(5) that the total amount undistributed is entered on the back of the roll and returned to the headquarter's office along with the roll;

(6) that the certificate on the back of the roll is signed;

(7) that the dates of receipt and despatch are entered in the docket; and

(8) that there has been no undue delay in the payment of money of in the return of the roll.

125. The Head Accountant will on receipt of the roll with undisbursed amount note the R.C.R. No. and C.B. No. and date and get it attested by the Deputy|Assistant Director or the Superintendent. Thereafter, the date of receipt of the roll and the undisbursed amount will be noted in the acquittance roll Register. The Roll should be submitted to the Deputy|Assistant Director for file orders. after all action is completed. The date of file orders will be noted in the Acquittance Roll Register and the entry closed in red ink.

126. Undisbursed salaries which are not likely to be disbursed immediately should be refunded by short drawal in the next pay bill or as soon as possible and in any case, not exceeding 3 months after obtaining the orders of the Deputy|Assistant Director.

127. Subordinates ordered to undertake journeys for which they will be entitled to travelling allowance will, if they apply, be drawn and paid necessary advance in accordance with the rules in Tamil Nadu Manual of Special Pay and Allowances.

128. He should also be given a blank Travelling Allowance bill and the Surveyor asked to prepare the Travelling Allowance Bill, if he had performed any journeys during the previous month and present it along with the diary. If the Travelling Allowance Bill is not presented along with the diary, the individual should report the reasons for the delay in presenting the Travelling Allowance Bill with the diary itself. In any case the individual should see that the Travelling Allowance Bill is submitted to the Head Office through the Inspector of Survey and Land Records or other officers, as the case may be, as quickly as possible. A claim presented after the expiry of three months from the date the journey is performed will become inadmissible.

129. An advance towards travelling allowances on tour may be sanctioned to subordinates who are required to tour and who are not in receipt of fixed travelling allowance. Such advances should be regulated under the conditions laid down in Article 84 of Madras Financial Code, Volume I.

130. To an officer under orders of transfer, an advance of a month's pay recoverable in 3 monthly instalments, and an advance of travelling allowance limited to the claim to which the Officer would be eligible and recoverable in a lump sum in the travelling allowance bill for the journey, may be drawn in a bill in the Madras Travelling Code Form No. 40 and paid to the individual. The advances drawn and paid should be noted in the objection book for advances and should be noted in the last pay certificate of the individual, in case he is transferred from the jurisdiction of the Officer sanctioning the advance. These advances should be regulated with reference to article 239 of Madras Fundamental Code, Volume I.

131. All bills for travelling allowance should be checked by the head accountant immediately on their receipt. He should see that the necessary certificates for exchange of daily allowance for mileage, for hiring conveyances, for claims to daily allowance for more than ten days at one place and for carriage of horses by rail, accompany the travelling allowance bill. The bills should then be submitted by the head accountant with his remarks to the Deputy|Assistant Director for orders.

132. Travelling Allowance drawn should be entered in acquittance rolls and the signatures of the payee obtained in it, with revenue stamps affixed, wherever necessary.

133. Travelling allowance of field men will be sent to them through the section officer.

134. A disbursing officer's register in M.T.C. form No. 70 should be maintained by the Head Accountant. Entries should be made in the register for every bill encashed each day with particulars under each detailed head of expenditure. Refunds by cash in chalans made each day in respect of bills already encashed should be noted in the register in red ink. The total must be struck for each treasury month. An extract for each month should be sent to the Treasury for verification and the extract should be submitted to the Joint Director of Survey and Land Records before the fifteenth of the succeeding month.

135. The cash, contingent, travelling allowance and advance books should be submitted with vouchers for the initials of the Deputy| Assistant Director daily, when he is at headquarters. When he is on tour, the Superintendent will initial every entry in the books.

136. The cash chest will, as a rule, be lodged in the District or Taluk treasury, and when sent for; must be returned before the Treasury closes for the day it will be opened only in the presence of the Deputy|Assistant Director or the auperintendent, who should keep the key himself. Before closing the chest a statement of contents must be prepared in Form No. 93.

137. The cash book should be closed on the first of each month, the details of the balance under each head being entered with a list of individual for whom pay has been drawn, but not yet paid. The names of the individual, amount due and month for which due, must be given. The cash balance should be checked every day on which there are transactions.

138. The Deputy|Assistant Director has discretionery authority to disburse the pay or allowances of public servants absent on duty or on leave, to persons whom they may empower to receive it at headquarters, but care should be taken that all salaries are drawn in the real names of servants, and that the individual to whom the pay is due signs the receipt.

139. Whenever any payment is made to an illiterate-payee, his left thumb-impression should invariably be obtained in token of receipt of payment and attested by some known person.

140. Claims to arrears of salaries due to deceased Government servants may be drawn after a report of the date of death is received from Tahsildar. The amount may be paid to the individual in whose name the succession certificate is given by the Tahsildar or the payment may be made through the Tahsildar. When more than one person claims, payment the parties pay be asked to produce a succession certificate from a Civil Court.

141. No claims for arrears relating to periods exceeding one year can be drawn before the bills are pre-audited by the Accountant-General. The instructions in the Madras Financial Code, Articles 52, 53 and 54 should be followed.

142. In the case of non-gazetted employees who are transferred to the jurisdiction of another drawing officer, a last pay certificate showing the last payment made should be sent to the new drawing Officer.

In the case of a Gazetted Officer on transfer from one District to another, a last pay certificate issued by the Treasury Officer of the former district should be attached to the first bill presented at the new treasury.

143. Applications for leave other than casual or compensation from Upper Subordinates other than Assistants, require the sanction of the Joint Director of Survey and Land Records.

144. Whenever it is necessary to send a subordinate for medical examination as to the amount of leave that should be granted to him or as to his fitness for further service he should be furnished with a letter to the medical officer in the form prescribed.

145. As soon as leave of any kind is granted, it should be entered in the register of leave granted.

146. Whenever an Upper Subordinate other than Assistants, whether on the permanent or temporary establishment, proceeds on or returns from leave other than casual or compensation or is transferred from one Unit to another, a report of departure or arrival should be made at once to the Joint Director of Survey and Land Records.

147. For all subordinates in superior service and in the Tamil Nadu Last Grade Services, Service books will be kept in the prescribed form under the immediate supervision of the Head Accountant. For those paid from contingencies, service sheets should be maintained.

148. All leave other than casual and compensation and punishments such as reduction, suspension, dismissal and removal from service should alone be entered in the service book.

149. When an individual leaves the department or is transferred to another office his service book should be written upto date without delay and the following entry made :—" Services certified verified upto ...... and for ...... with reference to the entries in the rough pay bills ". This should be attested by the Deputy|Assistant Director. Similar certificates should be appended in the Service Books of all the subordinates at the end of each Calendar year.

150. The service books are sent to Government with applications for pension or gratuity. In cases of re-entertainment, they are obtained back from Government and the amount of pension or gratuity granted is entered in them.

151. When the services of a Government servant are terminated by dismissal, his service book should be retained for a period of five years or until the Government servant's decease, whichever is earlier, after which it will be destroyed. A similar procedure should be followed in the case of a Government servant whose probation is terminated. The head of the Office in which he was last employed should retain the service book in such cases.

152. When a Government Servant's service is terminated by resignation or discharge without fault and no pension is given to him, his service book should be retained for a period of 5 years from the date of his resignation or discharge. In the event of his death within the period of 5 years, the service book should be retained for a period of six months only from the date of his death.

The service book of a Government servant, who has been dismissed and who is afterwards reinstated should, on requisition, be returned to the Head of office in which he is re-employed. A similar course should be adopted when a Government servant has been discharged without fault or resigns and is subsequently re-employed.

153. A report to the effect that the service books have been verified and kept up to date will be made to the Joint Director of Survey and Land Records in the Annual Administration Report.

154. The cost of the labour employed and of the survey marks used in any survey, notified under section 5 of the Tamil Nadu Survey and Boundaries Act, 1923 plus a surcharge of 50 per cent of the total cost of hired labour and survey marks shall be divided and apportioned among the persons who have any interest in the land, or in the boundaries, of which the survey has been ordered in the prescribed manner and shall be recoverable from such persons as an arrear of land revenue.

155. In order to defray the cost of these items in the first instance, the Collector of the headquarters district should be intimated of the amount of advance required in the form of an over draft under cost of survey marks—B. Survey Officers, with a request to apply to the Government for sanction. The overdraft applied for will be sanctioned to the Collector. The Deputy|Assistant Director may draw the bills for stones and hired labour against this over draft. The administrative accounts in respect of this overdraft will be maintained by the Collector.

156. The cost of stones, including carriage, will be drawn from the temporary advance by the contractor on bills in Form No. 6 passed by the Deputy|Assistant Director of the Survey Unit.

In bills for less than Rs. 25 the total should be rounded off to the nearest multiple of 5 paise and in those for Rs. 25 and upwards to the nearest rupee.

Note.—A certificate to that effect that the stones purchased for purposes of survey marks have been brought on to the stock registers and that necessary notes of payment have been made to avoid a second claim on the same account should be furnished on each bill.

157. The other charges, such as hired labour employed for line clearing, planting stones and measuring lines, and the pay of stone accountants will be drawn by the Deputy|Assistant Director by Survey Officer's bills in Form No. 101. As the pay of stone accountants is drawn separately on regular establishment bills, the amounts drawn on Survey Officer's bills towards this charge should be credited by transfer to the appropriate budget head.

158. The amounts drawn by bills in Survey Forms 6 and 101 are recouped by the collection of the Survey charges according to the

cost rate statements sent to the Collector by the adjustment of bills for survey charges debitable to Government and by cash refunds if any credited by the Deputy|Assistant Director in chalans.

159. The maintenance of the accounts for the transactions relating to the overdraft sanctioned will be attended to by the Assistants or Junior Assistants in the accounts section. The Deputy|Assistant Director should send to the Collector every month a statement of amounts drawn against the overdraft and the amounts refunded if any.

160. The head stone accountant will be responsible for the upkeep of the following registers:—

(1) Register of stone pass lists—Form No. 102.

(2) Register of village stone accounts—Form No. 103.

(3) Register of landholder's bills and charges debitable—Form No. 104 A.

(4) Talukwar credit, debit and balance account of temporary advance—Form No. 105.

(5) Statement of areas on which survey charges are to be collected—Form No. 107.

(6) Statement of outstanding advance—Form No. 108.

161. There should be a separate register of pass lists. Form No. 102, maintained depot-war for each taluk. Entries in columns 1 to 10 should be made on receipt of pass lists from field, and in columns 11 to 19 on receipt of the contractor's bill Form No. 6 The register will thus show the number of passed stones in each depot available for carting to villages.

162. The Contractor should sign both the original and duplicate pass lists and hand over the duplicate to the Officer passing the stones and retain the original with him. He will after verification enter in his accounts the number of stones passed, and send the original pass lists with the Bill for the stones supplied.

163. The Deputy/Assistant Director will send the contractor a copy of the estimate of stones required for each village (Rule 9, Chapter I). As stones are passed they should be carted without delay and delivered to the village munsiffs or other persons authorized to receive them. Vouchers should be obtained in token of delivery and submitted with a bill, Form No. 6 in duplicate.

164. On receipt of the bills and vouchers the stone accountant should see that the balance of passed stones in each depot were sufficient to cover the number carted, and should enter in the register Form No. 103, the number of stones carted to each village. The bill should then be checked and submitted to the Deputy/Assistant Director with the register, Form No. 102 for being passed.

165. One copy of the bill should be marked "original" in red ink and with this should be stitched the village munsif's receipts for the delivery of stones in villages.

166. After checking the bill the Deputy/Assistant Director will pass the duplicate copy for payment and initial column 20 of register in Form No. 102. Across the original should be written "cancelled". Duplicate passed for payment in Bill No. .... and the word "cancelled" should be written or typed in red ink in bold letters across each voucher over the Deputy|Assistant Director's initials.

When only a part of the number of stones covered by a pass list is billed for, the bill number and the number of stones for which payment is made in the bill should be noted and attested by the Deputy/Assistant Director. When the balance number of the passed stones is billed for and passed for payment in subsequent bills, similar particulars should be noted in the pass list and when all the stones included in a pass list are paid, the pass list in original and duplicate should be cancelled under the initials of the Deputy/Assistant Director. The carting lists should also similarly be cancelled. No stones should be passed in excess of the indents. It is desirable that the number of stones billed for at any time covers the indents in full. Copies of indents should accompany the Contractor's bills.

167. The cancelled bill with its vouchers should be filed in the Unit Office. The duplicate bill should be returned to the Contractor for encashment in the treasury with instructions to report the date of encashment without delay. On receipt of this report the number, date and amount of the bill should be entered in the register of credit, debit and balance account Form No. 105.

168. The register, Form No. 105, should be kept up to date and submitted for check every time an entry is made.

169 There should be a separate register of village stone accounts Form No. 103, for each taluk, one or more pages as may be necessary being allotted to each village. The village should be entered in the register in the consecutive order of their taluk numbers.

170. Columns (1) to (6) of this register will be filled in from vouchers furnished by the contractor—*vide* rule 163 supra

171. As soon as the records of a khandam are received from field, the expenditure should be posted in columns 7 to 14 of the register (after checking the entries in the stone account) with the stones shown in the field demarcation sketch (rule 25, Chapter VII).

172. As soon as the consolidated village stone account is received from field, the entries therein should be compared with

those already made in the register in the unit Office, and the register submitted to the Deputy|Assistant Director with remarks, should there be any discrepancy.

173. The Deputy|Assistant Director will pass orders regarding any stones not accounted for. Their cost should ordinarily be recovered from the persons responsible.

174. Surplus stones should be transferred to the nearest villages where survey may be in progress.

175. As soon as the survey of a taluk is completed, the stone Accountant in the Unit Office should make out a statement of the surplus stones village war with reference to the accounts sent by the Deputy Surveyor under rule 24 of Chapter XIX, indicating at the bottom of it the cost of the stones. This statement, with the total number of maintainable stones (approximately) according to the new survey filled in by the Survey Department should be forwarded to the Collector through the Taluk Tahsildar with a covering letter and one set of acknowledgments of the village munsifs, the other set being filed in the Head Office with the Stone Accounts. The Tahsildar should after being satisfied that the village-war statement of surplus stones is supported by the acknowledgments of the village Munsiffs concerned, accept the statement without verification and immediately determine and note in the statement the number of stones required for maintenance. The Statement should then be forwarded to the Collector for acceptance and return to the Deputy|Assistant Director of the Survey Unit Office with a declaration to that effect. The statement with the declaration of the Collector will then be sent to the Treasury Officer concerned, requesting him to credit the cost of the stones accepted to "Revenue Advances—Cost of Survey Marks—B Survey Officers" by making a corresponding debit under the head "Revenue Advances Survey Marks—A Collectors". The cost rate to be adopted for this purpose should be the survey rate, provided however, it does not exceed the selling price of revenue stones. The stones not required should be auctioned by the Tahsildar and the sum realised should be credited to 029 L.R.—01 (C) survey and settlement operation. The cost of surplus stones not required by the Revenue Department should be drawn from the survey budget and credited to "Revenue Advances —Cost of Survey Marks—B Survey officers", the cost rate to be adopted for these stones being the survey rate.

176 The stone accounts and the indents should be filed village-wise.

177. The charges recoverable from land holders on account of demarcation and measurement of their lands are as follows :—

Cost of stones which includes carriage of stones.

Coolies hire for planting stones.

(3) Pay of chainmen and flag holders employed by all grade of surveyors and inspecting officers.

(4) Pay of stone accountants.

(5) Hundred percent of the aggregate of items 1 to 4 as a survey charge to cover the cost of supervision, storage, indenting and other Miscellaneous items of work connected with the above. (G.O. Ms. No. 93, Commercial Taxes and Religious Endowments Department, dated 31st January 1975).

178. The charges under the first three heads above pertain to the following items of work done and separate accounts should be maintained in respect of each of these items :—

(i). Boundary demarcation.

(ii) Traverse survey.

(iii) Field demarcation and measurement and

(iv) miscellaneous, e.g., teest corrrection, land complaint correction, supplemental sub-division survey, etc

179. As item (iv) above is ordinarily done several months after the completion of the other items, the charges under items (i) to (iii) should first be apportioned and recouped monthly as villages are completed, leaving item (iv) to be dealt with later (*vide* rule 182 infra).

180. The apportionment shall in both cases be on area. For this purpose, (an acre) a Hectare of wet land will, except in the deltaic tracts in Thanjavur and Kanyakumari districts and Shencottah taluk of Tirunelveli district where both dry and wet are to be treated alike, be considered as equivalent to (an acre) a hectare and a half of dry, waste or poramboke. All fields of (50 acres) 20 hectares in extent will be charged at one fourth of the (acreage) hectareage rate for dry land.

The area to be adopted for the purpose of the apportionment will be the latest adangal area as compared and reconciled with the total diglot area obtained from the Tahsildar, after making allowances for changes consequent on:—

(i) Amalgamation or splitting up of villages at the resurvey ;

(ii) constitution of new reserved forests or disafforestation ;

(iii) erosion or accretion in the riverine or maritime villages ; and

(iv) inclusion of portions of villages in municipalities

The latest adangal area referred to above will be the area according to the adangal as finally determined at the previous jamabandi. Particulars of such area, villagewise, i.e., wet, dry, poramboke, etc., should be obtained by the Survey Department from the Tahsildar in Form No. 128-A as the Survey of each village or group of villages is completed. The Tahsildar should furnish the information within ten days after the receipt of the requisition.

181. The rate per (acre) hectare on items (i) to (iii) under rule 178 added together should be worked out monthly in accordance with the detailed instructions contained in the rules under clause 2 (*g*) of Section 26 of Tamil Nadu Act VIII of 1923. *Vide* Appendix 1-B, volume I of the Survey Manual.

182. On completion of item (*iv*) in the entire taluk, the charges therefore together with the pay of stone accountants, the item iv, under rule 178 supra should similarly be apportioned on the lands surveryed in the whole taluk. The area to be adopted for this purpose will be the re-survery areas.

183. After the cost rates have been arrived at, the total demand recoverable from the ryots of each village and to be credited separately (1) to cost of "Survey Marks B Survey Officers" and (2) to "029 L.R..—01(C) Survey and Settlement operation" should be worked out. A list of resurvey fields over (50 acres) 20 hectares in extent with the corresponding old numbers should be prepared to be sent as enclosures to the cost rate statement. But only those old survey and subdivision numbers the whole or major portions of which have been included in the re-survey field should be shown therein as they alone will be entitled to the benefit of the one fourth rate.

The Tahsildar should, immediately on receipt of the above, apply the cost rates to the several holdings according to the current revenue accounts paying due attention to the changes in area, if any, intimated by the Survey Department and work out the demand as expeditiously as possible. After reconciling promptly any appreciable differences between this demand and the survey demand in consultation with the Survey Department, the Tahsildar should intimate the amount finally arrived at to the Survey Unit Officer who will accept it as correct.

The Deputy|Assistant Director should take similar action in regard to the supplemental cost rates worked out under rule 182. Any excess or deficit arising as a result of the reconciliation of the total demand as arrived at by the Tahsildar and that furnished by the Deputy|Assistant Director of Survey and Land Records should be credited to "029 LR—01(C) Survey and Settlement operation" or debited to the Survey budget, as the case may be.

184. Where the locality surveyed lies (*a*) within the headquarters district, the cost rate statement with enclosures will be prepared, in duplicate and (*b*) outside the district, in triplicate.

If the locality surveyed lies within the headquarters district, the Collector will note this amount of the cost rate statement to be recovered as a credit to "cost of survey Marks B" Survey Officers in the Survey Unit folio as a credit under the "Survey Officers" and as a debit under the Tahsildar and at the same time note the amount, in the demand collection and balance statement and send the duplicate copy with enclosures, to the Tahsildar of the Taluk in which the Survey was made.

If the locality surveyed lies outside the headquarters district, the Collector of the headquarters district will, on receipt of the cost rate statement, note the amount, relating to the "Cost of Survey Marks—B Survey Officers" as a credit to "the Survey Officers" and as a debit to the Collector of the outside district and send the duplicate and triplicate copies of the cost rate statements to the Collector of the foreign district. The latter Collector will note the amount relating to "Cost of Survey Marks—B. Survey Officers" as a debit in his cost of Survey Marks account opening a folio for the survey unit and note it also in his demand, collection and balance statement. He should forward one copy to the Treasury Officer of his district. The Treasury Officer should raise a debit in the plus and minus memo of the District against the Survey Unit concerned, and intimate the Collector of his district and the Treasury Officer of the Headquarters district of the adjustment made. The Collector of the foreign district will then intimate the acceptance of the debit to the Collector of the Headquarters district, who will enter the full amount as credit in his demand collection and balance statement. The Treasury Officer of the Headquarters district should also note the credit in the plus and minus memo of the district.

In order to accept the debit passed on by the Collector of the Head quarters district the Collector of the Foreign district should have sufficient overdraft limit. The Collector should either get a fresh allotment sanctioned by Government or arrange with the Collector of the Head Quarters district for the transfer of the allotment required.

The ryots share having thus been determined, the rest of the cost for the village or group of villages should be drawn by the Deputy|Assistant Director on a contingent bill and adjusted to the credit of the Revenue advances Cost of Survey Marks—B. Survey Officers.

185. The Deputy|Assistant Director cannot take the amount covered by the ryots' share in the cost rate statement as a real credit for the purpose of drawing bills, unless the amounts are actually collected from the ryots and remitted into the treasury.

As the administrative accounts in regard to the overdraft sanctioned are maintained by the Collector and collections are also made and watched by the Revenue Department, the entries made in the register in Survey Form No. 105 will not indicate the actual amount of the overdraft available for drawal. The monthly collection of the ryots' share of the cost rate statements already sent by the Deputy|Assistant Director should be intimated to the Deputy|Assistant Director by the respectitve Tahsildars and the Collector. The credits intimated as above will be entered in the C.D.B. register maintained by the Deputy|Assistant Director to enable him to know the amount of the overdraft available for drawal.

186. An extract from the cost rates communicated to Collectors should also be reported then and there to the Joint Director of Survey and Land Records for information.

187. An extract from the register in Form No. 108 should be submitted to the Joint Director of Survey and Land Records every month.

RECORD KEEPER.

188. The record-keeper has custody of all records and is responsible for keeping them safe.

189. He will maintain the following registers:—

(1) Register of village records—Form No. 109.

(2) Register of Records received and returned—Form No. 66.

(3) Register of records issued--Form No. 86.

(4) Progress register of area measured in field and of records received in Office—Form No. 71.

(5) Register of inspection of field work—Form No. 79.

(6) Calendar of diaries.

Note.—Items (1) to (5) should be maintained District wise and by taluks.

190. On receipt of records, they must be carefully compared with the invoice and any discrepancy or damage reported at once to the Deputy|Assistant Director.

191. Except to see that the records are complete and in good preservation and duly signed by Surveyors and Inspector of Survey and Records, the record keeper is not required to compare or examine them. It is not his duty to ascertain the correctness of the entries. That is the duty of the Inspector of Survey and Land Records in the field who signs the records before they are sent to the Office.

192. The record keeper is responsible for the prompt distribution of records received from field to the office sections concerned.

193. Whenever a record is issued in office, the signature of the individual to whom it is issued must be taken in the issue register and a dummy placed in the place from which the record is removed.

194. Records should be sent to field with an invoice which should be signed and returned in acknowledgment of receipt.

195. The record keeper will be specially careful to obtain an acknowledgment for every issue of records.

196. He must see that the records taken out of the record room are not kept back in the sections unnecessarily. To ensure the regular and systematic return of records to the record room, the record keeper should prepare on the first of every month an arrear list for each section for all records remaining out of the record room for more than three months together with the name and designation of the individual to whom each record was issued and date of its issue. He should at the same time furnish an extract from the arrear list separately to each clerk or draftsman to enable him to check whether the records referred to are with him and to return them when no longer required for reference. A new requisition slip should be taken whenever a file or record has to be retained for more than three months since the earlier slip was issued.

When the record keeper has to get back a document filed in a Court, he should note on the requisition slip and in column 10 of the record issue register as sent to Court, vide current No. . Such slips need not be renewed.

The Section-head concerned, should certify on the arrears list that no record has been detained by the Assistant or Junior Assistant or Draftsman after the purpose for which it was taken has been served.

The arrears lists should be submitted to the Deputy|Assistant Director on the 10th of each month for perusal and orders.

197. The traverse field books should be stitched together with all correction lists, to form one volume for each village.

198. The traverse sheets should be stitched together in the same way as the traverse field books.

199. The field measurement books should be stitched together so as to form one or more volumes for each village.

200. The area lists will be in separate volume, one for such village.

201. In addition to the records of Survey, the record keeper takes charge of the diaries of all field subordinates. The record keeper will keep a calendar of diaries and call for those not received on due dates. He should also bring to the notice of the Deputy| Assistant Director, whether records of any completed khandams shown in the Diary of the Inspector of Survey and Land Records as having been despatched to the Headquarter's Office have not been received.

Immediately after posting entries in the calendar of diaries, the record keeper will communicate the orders passed on the diaries by the Deputy|Assistant Director and take further action, if any, on the orders. He will also see that the diaries are handed over to the accounts section in time for the preparation of the pay bill.

202. From the register of inspection of field work, the record-keeper should fill up the fourth page of the office final examination report.

203. The record keeper should prepare a quarterly return in Form No. 80 from the register of inspection of field work. This return should be submitted to the Deputy|Assistant Director in time to admit of its check and submission to the Joint Director of survey and land Records on the date prescribed in the calendar of returns.

204. Whenever any records are required from the Central Survey Office, they should be obtained on indents in Form No. 110.

The duplicate invoices received from the Central Survey Office, and those received from field and other Deputy|Assistant Director should be placed in chronological order. There should be separate file for each calendar year.

205. The record keeper should pay particular attention to the prompt despatch of completed records and maps to the Revenue Department and to the Central Survey Office.

STORE-KEEPER.

206. The Store-keeper has custody of stationery, stores, instruments, books and printed forms.

207. He is required to deposit as security Rs. 350 in cash and execute a security bond before he is appointed. The amount will be returned to him after six months from the date of vacation of his Office, but the security bond shall be retained permanently or until it is certain that there is no further necessity for keeping it.

208. He will maintain the following registers:—

(1) Stock book of stationery and forms.

(2) Stock book of stores—Form No. 64.

(3) Individual ledger of instruments - Form No. 111.

(4) Stock book of furniture.

(5) Individual ledger of furniture.

(6) Register of unserviceable article.

(7) Register of cost recoveries effected.

(8) Register of correction slips received and issued.

(9) Register for local purchase of articles.

(10) Register of practice - drills for putting out fire.

(11) Stock book of forms in C.F. No. 345.

(12) Cash book for permanent advance.

(13) Attendance register.

(14) Register of consolidated store accounts (monthwise).

(15) Register for casual and compensation leave.

209. Stores and stationery should be separately registered. Where stationery is received or issued, the necessary entries should be made without delay in the stock book and the balance struck.

210. When a theodolite is received into or issued from store, it will be examined by a Gazetted Officer or Inspector of Survey and Land Records and the result of examination recorded in C.F. No. 179. These papers will be carefully filed by the Store-keeper.

A separate file of examination reports should be maintained for each instrument. Action must be taken in a General current number to fix the responsibility for the new defects pointed out in the inspection report and to get the defects rectified under the orders of the Deputy|Assistant Director.

211. When a theodolite is issued from the Central Survey Office, it will be accompanied by a report on the condition of the instrument and a list of contents of the box. A copy of the list will also be pasted inside the lid of the box. The report and the list should be verified immediately on receipt of the instrument and any defect or damage that may be noticed, brought to the notice of the Deputy Director of Survey, Central Survey Office. If no report is received, it will be presumed that there is nothing in the instrument calling for remarks.

212. If the contents of any package are received in a damaged state, he will report the matter at once to the Deputy|Assistant Director.

Immediate action should be taken to bring the matter to the notice of the Officer who sent the package. The Railway or Transport authorities must be appraised of the actual position which shall also be got noted by them in writing.

213. The store-keeper should take care that all records, stores and stationery intended for despatch are securely packed. He will be held responsible for any damage caused by his neglect. Instructions for the packing of records are contained in Appendix No. XX and in Appendix No. XXIV for the maintenance of store account.

214. The bundles of stationery articles received should be opened and checked in the presence of the Deputy|Assistant Director or the Additional Officer. Shortage in or excess of receipt of over 5 percent of the total invoiced should alone be taken to the notice of the Controller of Stationery. However, the actual number received will alone be receipted in the stock book. The store-keeper should follow the instructions in Chapter VI of the Stationery Manual Volume I, while dealing with stores and stationery received from the Controller of Stationery.

215. The store-keeper is responsible that strict economy is observed in the expenditure of stationery and that not more than that is necessary is issued.

216. The quantity allowed for each grade is shown overleaf. He should see that the quantity allowed in Appendix VI (extracted overleaf) to the Stationery Manual, Volume II is not exceeded at any time while supplying stationery. The Store-keeper will supply to each Field and Office section on indents received from them, on the 20th of March, June, September and December, the quantity required for the quarters commencing from the 1st April, July October and January, respectively, as finally passed by the Deputy| Assistant Director.

Rank.	*Monthly.*			*Annual.*					*Biennial.*		
	Blotting Sheets.	*Steel nibs.*	*Black lead pencils.*	*Red pencils.*	*Blue pencils.*	*Copying pencils.*	*Drawing pencils.*	*Phonetic pencils.*	*Pen holders.*	*Pencil eraser.*	*Ink and pencil eraser.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1 Joint Director of Survey and Land records.	1	3	6	1	2	..	..	..	2	1	1
2 Deputy Director of Survey, Central Survey Office.	1	3	6	1	1	..	..	..	2	1	1
3 Deputy/Assistant Director of Survey in Survey Units.	1	3	6	1	1	..	..	..	2	1	1
4 Works Manager	1	3	6	1	1	..	..	..	2	1	1
5 Assistant Manager, Photo Zinco Press.	1	3	6	1	1	..	..	..	2	1	1
6 Manager (Tech.)	1	3	6	1	1	..	..	..	2	1	1

7 Inspector of Survey and Land Records.	1	3	6	1		..	..	..	2	1	1
8 Superintendents in Survey Units	½	3	4	..	..	..	..	..	2	1	..
9 Superintendents in Central Survey Office.	½	3	4	..	..	..	..	..	2	1	..
10 Head Accountant (Asst.) ..	½	3	4	..	..	..	..	..	2	1	..
11 Head Clerk (Asst.)	½	3	4	..	..	..	..	..	2	1	..
12 Jr. Assistant including Record Keeper and Store-keeper.	½	3	2	..	..	..	..	..	2	1	..
13 Sr. Computor-Draftsman ..	1	3	4	..	..	..	..	..	2	8	2
14 Head-Draftsman and Head-Computor.	1	3	4	..	..	12	..	..	2	8	2
15 Head Typographer	1	3	4	..	..	..	..	..	1	1	..
16 Typographer	1	1	4	..	..	..	..	..	1	1	..
17 Other Typographers	1	1	4	..	..	..	..	..	1	1	..
18 Junior Computor–Draftsman ..	1	3	4	..	..	12	..	..	2	8	2
19 Asst. Manager	1	3	6	..	..	2	..	..	2	1	1
20 Technical Assistants	1	3	6	..	..	2	..	..	2	1	1

	Monthly.			Annual.					Biennial.		
	Blotting Sheets.	*Steel nibs.*	*Black lead pencils.*	*Red pencils.*	*Blue pencils.*	*Copying pencils.*	*Drawing pencils.*	*Phonetic pencils.*	*Pen holders.*	*Pencil eraser.*	*Ink and pencil eraser.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
21 Reproduction Personnel	2	2	..	..	..	12	..	..	1	..	1
22 Reproduction Assistants... ..	½	2	4	..	..	..	..	..	1	..	..
23 Mechanic / Asst. Mechanic ..	½	2	2	..	..	..	..	..	1	..	..
24 Typist / Steno-typist	½	2	2	..	..	..	..	..	2	..	..
25 Record Clerks	½	2	2	..	..	..	..	..	1	..	..
26 Head Surveyors, Deputy Surveyors, Field Surveyors.	½	3	3	..	..	..	..	..	2	1	1

The indenting officers should be required to note in their indents the strength of the staff at the beginning of each quarter.

217. The quantity of stationery required must be carefully estimated. Indents are due in the Central Survey Office on the 1st of May for articles required for use from the October following.

218. The store-keeper will keep accounts of receipt and expenditure of printed forms in the same manner as for stationery. A sufficient supply of forms to last for six months should always be kept in store.

219. Separate indents should be sent for (1) instruments, (2) Stationery and miscellaneous stores and (3) books and printed forms. When submitting indents for instruments the number in the Survey Unit serviceable and unserviceable, must be stated in the column of remarks.

The store-keeper must follow the Instructions laid down in paragraphs 13 to 38 of the Stationery Manual Volume I and he must watch the supply and put up timely reminders for the supply of articles still due for the year as after the close of the supply year, the balance due will lapse.

220. Unless required for packing purposes, the packing cases in which the annual supply of stationery is received must be returned to the Controller of Stationery and Printing, Madras-1. A register should be maintained for the packing cases received and disposed off.

221. The store-keeper has charge of the office library. Every book in the library must be numbered to agree with the catalogue

222. The office attendance roll will be kept by the store-keeper.

223. All Office subordinates, except those specially exempted will report their arrival daily to the store-keeper or his assistant who writes the attendance book. Ten minutes after the time fixed for office attendance the book should be sent to the Deputy|Assistant Director or in his absence to the Superintendent. At the end of each month, an abstract of late attendance and absence will be made out and submitted to the Deputy|Assistant Director for orders.

224. The record-keeper and others, whose attendance may be necessary, will attend half an hour earlier than the rest of the office establishment in order that the draughtsmen and computors may commence work without any delay, and remain half an hour later in order to see records put away. These individuals will be allowed an hour's leave in the middle of the day.

225. A register of attendance on holidays and compensation leave granted in lieu of such attendance will be kept by the store-keeper.

226. The returns to be submitted by the Store-keeper are shown in Appendix No. XXVII.

227. The Store-keeper should take action to get the defective furniture repaired or replaced. Old unserviceable furniture and other articles which are beyond economical repairs are to be condemned after obtaining the orders of the Deputy|Assistant Director or the Board of Revenue according to the limit prescribed. The Deputy|Assistant Director can incur an expenditure up to Rs. 100 at a time for the purchase of new furniture or repairs to furniture available according to item 23 in Appendix 7—Tamil Nadu Financial Code, Volume II (Pre—1968 Edition *vide* preface in 1968 Edition in Volume II also).

228. The periods of wear and tear in respet of stores and instruments are furnished in the Appendix No. XXIV which contains instructions for condemnation and replacement of unserviceable. The orders of the Board are to be obtained for condemning the unserviceable articles. The articles condemned are to be disposed of as follows :—

Articles made of iron, except for the compasses and drawing pens are to be sold in public auction and the proceeds must be credited to the Head "029 L.R.—01(C) Survey and Settlement operation".

The compasses and drawing pens are to be sent to the Central Survey Office where these may be repaired if possible or destroyed.

Condemned wooden scales, bits, metallic tapes are to be destroyed.

229. The Store-keeper should maintain the Register for practice in Drills for putting out fire. He should take action to consult the Executive Engineer for the number of articles of fire extinguishers, spare refills and fire buckets required as initial supply and to purchase the articles required from the Superintendent, Public Works Department, General Workshops, Madras. He must also take action for the replacement of unserviceable fire buckets and fresh refill required, to arrange for the training of a member of establishment by fire department and for the conduct of periodical drills. He will be guided by the detailed instructions in Appendix C of the District Office Manual.

230. The store-keeper should maintain a register for local purchases of sundry articles such as packing materials, kerosine, etc. Local purchase should be made under the prior orders of the Deputy| Assistant Director and they are subject to special check during the annual Inspection of the Office.

GENERAL RULES.

231. The Special Rules for the Tamil Nadu Survey and Land Records Subordinate Service govern the subordinates and specify the educational qualifications to be possessed and the departmental tests to be passed by the members of the subordinate service.

232. Candidates desirous of an appointment in this Department should register their names in the District Employment Exchanges. The Deputy|Assistant Director of the appointing authority concerned will request the Employment Exchange Officer to send an adequate number of candidates for interview and selection.

233. A candidate for appointment to a post will have to satisfy the requirements in regard to age, educational and other qualifications with reference to the special rules governing the service.

234. Leave of absence is granted to subordinates as provided for in the Tamil Nadu Leave Rules or other rules which may be applicable as prescribed by Government.

235. The grant of casual leave shall be regulated with reference to the instruction contained in this regard in Annexure VII to the Fundamental Rules and instructions issued by the Government in this regard.

236. Government servants who are called on to attend office on an authorized holiday, except as a punishment, may be granted another holiday in its place when opportunity offers with reference to rule 169 of D.O.M. and instruction that may be issued by Government from time to time.

237. It must be clearly understood that the grant of all leave except that necessitated by sickness is entirely subject to the exigencies of the public service, and that the Officer empowered to grant the leave may withhold it if he sees cause.

238. Due notice must always be given when applying for leave. If the application is for more than one month, it should be sent in at least one month before the intended date of departure. Leave when granted must be availed of within five weeks from the date of receipt of the order or from the date from which the leave is granted whichever be later.

239. No leave can be taken in anticipation of sanction, and any one who departs before the leave is sanctioned will be treated as absent without leave though he may have submitted an application.

240. A medical certificate recommending leave cannot be regarded as equivalent to an order granting leave. The certificate is only an expression of the Medical Officer's opinion and an accompaniment to

the application for leave which it supports. No subordinate should avail himself of the leave recommended in the certilcate, without the written permission of his immediate departmental superior. If the medical officer certifies that a change of air is essentially necessary to recovery, the leave can be granted by such superior in anticipation of the sanction of the officer empowered to grant the leave. Otherwise, the previous sanction of the officer should be obtained.

241. Subordinates on leave requiring extension should apply for the same in time to allow of their returning to duty on the expiration of the leave, in case the extension applied for is refused. If the application for extension is on the score of or illness and the applicant happens to be at or near a station where there is a Government Medical Officer it will be sufficient if he appears before that Officer provided the certificate is countersigned by a Medical Officer not below the rank of a Civil Assistant Surgeon.

242. If extension of leave is absolutely necessary and could not have been foreseen in time to obtain orders in the ordinary course, a pre-paid telegram should be sent.

243. If extension is refused, the fact of having applied for the extension by letters or by wire will not be regarded as an excuse for overstaying the leave originally granted.

244. Absence without leave will usually entail loss of pay and will, besides, meet with severe punishment.

245. In the case of a subordinate, who is absent without leave, disciplinary action as contemplated in the Civil Service (Classification, Control and Appeal) Rules should be taken.

246. No subordinate should leave his station except with the written permission of his superiors.

247. The treatment of the period spent in suspension shall be decided with reference to the provision in the Fundamental rules, or the Civil Services (Classification, Control and Appeal) Rules according to the nature of the case.

248. Subsistence allowance shall be granted as prescribed in the fundamental rules during suspension.

249. Temporary Subordinates whose services, it is not necessary to retain, should be served with a notice, that they will be discharged one month after the date of the notice. No reason need be assigned. Subordinates so discharged, may be given a certfiicate of their service if asked for.

250. Every subordinate is required to give a month's notice before leaving the department.

251. Men who have been discharged or allowed to resign their appointments should not be re-employed without the consent of the officer under whom they formerly served.

252. Men who have been discharged as unfit for further duty cannot be re-employed without another certificate of fitness for duty.

253. Every report, complaint, or application from a subordinate must be sent, in the first instance, through his immediate superior who will forward it with any remarks he may consider necessary as to the truth of the statement, the justice of the complaint or the advisability of complying with the application.

254. Petitions signed by more than one person cannot be received. No attempt at combination to represent grievances is allowed. Each man must state his case for himself.

255. Anonymous or pseudonymous petitions will receive no notice.

256. Appeals preferred in disciplinary cases will be dealt with as laid down in the Tamil Nadu Civil Services (Classification, Control and Appeal) Rules.

257. The rules for the submission of petitions in the Board of Revenue are printed as Appendix No. XXII.

258. In all official correspondence, names of individuals should always be preceded by their initials. Where necessary the names should be written in full.

259. Whenever a village is named, its number must also be given.

260. No word or figure in a Public document should ever be erased. When an error has been made the incorrect entry must be lightly scored through and the correction written above or on one side and attested by the initials of the person signing the paper. The correction should, as a rule, be made in red ink, and if the document is an important one (area list, pay bill for instance), the number of corrections made must be noted at the foot of each page.

261. Every public document must bear the initials of the persons who prepared or copied it and examined or compared it. The date, month and year should always be added to the initials.

262. The necessity for the careful preservation of records is especially impressed on all. Serious inconvenience will generally be caused by the loss or destruction of even a single field book or sketch.

263. As regards records which were prepared prior to the introduction of the Tottenham system as well as those which are not brought on the disposal list, including the registers, forms accounts books, etc., kept in the office, a complete list with instructions as to their retention or destruction is given in appendix No. XXV.

264. Special precautions should be taken against fire and whiteants. The head clerk or other person nominated by the Deputy|Assistant Director for the purpose should carefully attend to the instructions regarding precautions against fire which are printed as Appendix No. XXXIV.

265. Office hours will be from 10-30 a.m. to 5-00 p.m. with half an hour for refreshment.

266. The second Saturday in each month will be a holiday as may be ordered by the Government, from year to year excepting in certain months.

CHAPTER XXI.

Central Survey Office.

1. (i) The Deputy Director is placed in-charge of the Central Survey Office and he is responsible for the proper working, good order and maintenance of discipline in the Central Survey Office.

(ii) The duties of the Deputy Director of Survey, Central Survey Office are different from those in-charge of District Survey Units. There is no field work for the Deputy Director of Survey, Central Survey Office.

(iii) The further processes in the records prepared in Survey Units like finalling, printing and publication of the Village maps, compilation and publication of Taluk, District, Town, composite maps and other special kinds of maps are done in the Central Survey Office besides preservation of the original records prepared in all the Units. Periodical revision and reprinting of village, Taluk and District maps, Town maps is also done in this office.

2. The general rules detailed for the Deputy Director in-charge of Survey Units in Chapter XVIII are generally applicable to the Deputy Director of Survey in-charge of the Central Survey Office. His main duties will be—

(i) Control and supervision of the various categories of staff of the Central Survey Office.

(ii) Managing the affairs of the Photo Zinco Press, an Industrial Establishment attached to the Central Survey Office.

(iii) Check of cash transactions with cash book and Subsidiary registers.

(iv) Purchasing mathematical precision instruments like Theodolites, Circumferenters, Chains, Metalic and Steel tapes, cross staffs, etc., for supply to all the Survey Units.

(v) Purchasing of plotting instruments like plotting scales and bits, Compass, Drawing pens, Parellel rulers, protractors, Pantagraph, Computing Scales, etc., for the use of all the Survey Units.

(vi) Scrutiny and consolidation of indents of the Department for the Standard Common Forms, Survey Forms, Stationery and getting them countersigned by the competent authority prescribed in the Printing and Stationery Manual. Scrutiny of indents for Books and Furniture required for the department and arranging for the supply and distribution after obtaining the orders of the competent authorities as read in the Financial Code or Printing Manual.

(vii) Arranging the purchase, stock and issue of numerous items of chemicals, litho articles, machinery, spare parts, etc., for utilisation in the Photo Zinco Press under order of sanction of the Two men or Three Men Committee, constituted in G.O. Ms. No. 2179, Revenue, dated 27th July 1959.

(viii) Printing and distributing the village Maps, Taluk and District touring Maps and State Maps.

(ix) Stocking the Street Survey records, Town Survey records, Land Complaint files, outline maps of the Districts and States and accounting for the same.

(x) Obtaining original survey records from the Office of the Tamil Nadu Archives, Madras, supplying them to the Officers undertaking resurvey operations, etc., and getting them back after necessary action for return to the Tamil Nadu Archives.

(xi) (a) Compiling and drawing of all departmental maps (Village maps, taluk maps, District maps, Town maps, Panchayat maps, Road maps, etc.,)

(b) Preparing the original colour guides for the Taluk and District Touring Maps and State maps for periodical revision and proving the same before final print.

(c) Preparing extra departmental maps required by other departments (such as Engineering scheme maps, Police charts and Election maps, etc.,) on any scale and in any colour as desired by the indentors.

3. The Central Survey Office is broadly divided into the following sections.

(1) Technical Branch (Computation, Drawing and compilation of various Maps.)

(2) Accounts Branch.

(3) Correspondence and Stores.

(4) Records Section.

(5) Photographic and Printing Section.

TECHNICAL BRANCH.

(Computation, Drawing and Compilation of maps).

4. The post of Manager (Technical) is the highest category with gazetted status in the Technical Branch of the Office.

Appointments are made to this post by promotion from the category of Head-Draftsman and Head-Computor in the Survey and Land Records Subordinate Service.

5. The main duties of the Manager (Technical) are.—

(1) The Manager (Technical) is in-charge of the computation, Drawing and Typographic Sections of the Drawing branch and he is responsible for the order and discipline, for the prompt and careful execution and accuracy of the work in the Sections.

(2) He should see that the work is properly distributed to all subordinates to keep pace with the programme fixed and is responsible for the quantity and quality of the work turned out in the Technical Branch.

(3) He should see that proper and prompt attention is paid to all correspondences received in the several sub-sections and sections and see that the incoming and outgoing periodicals are received and despatched on the due dates, as the case may be.

(4) The diaries of all the Computor-Draftsmen and Typographers of the various sections and Section Heads under his control should be checked by him to see that they have done properly, adequate and systematic work.

(5) On or before the 10th of every month, he should submit the diaries to the Deputy Director of Survey, Central Survey Office along with the monthly abstract statement of the outturn of each Computor-Draftsman, sub-section heads and section heads showing the number of days work done by them during the month, with his remarks for orders. Any short work or irregularity noticed in the work of the subordinates should be brought to the immediate notice of the Deputy Director of Survey.

(6) He should see that the annual programme of work is framed early in April every year for submission to the Director of Survey and Settlements, Madras through the Joint Director of Survey and Land Records, for approval.

(7) He should see that the various registers maintained in the Sections are posted promptly and maintained upto date.

(8) He will check the discrepancies pointed out in the error lists prepared in the various sections and get corrections not requiring field work carried out in the Office itself and put up and obtain the orders of Deputy Director in all cases where Test corrections have to be sent to field.

(9) He can grant casual leave to all the subordinates in the Sections except the Head-Draftsman and the Head-Computor.

(10) He is responsible for arranging prompt supply of stationery, forms, etc., required for the work in the Technical Branch by placing indents in time. He should also see that proper accounts for the supply and expenditure are maintained.

(11) He should see that proper accounts are maintained for the Stores, instruments, furniture and books supplied to the Sections and must submit consolidated returns every month on the due date to the Store Section.

(12) He is responsible for the proper training in all the processes of work according to the syllabus for the Junior Computor draftsman and Typographers recruited.

(13) He must maintain a diary in the form prescibed below indicating the duties perfomed by him daily and submit it once in a month to the Deputy Director of Central Survey Office for perusal. He will check up a fair percentage of the work done in getting the map ready for reproduction.

Month and date.	*Detailed Particulars of the work done for each day.*	*Remarks.*
(1)	(2)	(3)

HEAD-COMPUTOR.

6. The Head-Compuptor is in-charge of the Computation Section in Central Survey Office. The Section is divided into Sub-sections each under the control of a Senior Computor-Draftsman. The main duties of the Head-Computor are described in the Rules 7 to 21 below.

7. He is responsible for the correctness of the work done in the Sub-sections described in Rule Nos. 22 (1) to (28).

8. He should maintain an individual ledger and consolidated statement of instruments, books and furniture under the custody of the subordinates in his section.

9. The Head-Computor should write up a diary for the work done each day and submit the diary for the full month to the Deputy Director of Survey, before the 10th of the succeeding month.

10. He should check the diaries of the Computor-Draftsman and those of the sub-section-head daily and satisfy himself that they are turning out adequate work properly.

11. The Head Computor is responsible for the correct maintenance of the Area Register for each taluk with particulars of areas of Villages, forests, hills, etc., and an Area register for the State as a whole showing the areas of each Taluk in the Districts.

12. He should promptly carryout the changes consequent on the alteration of village Taluk and District boundaries in the concerned records and in the area registers under the orders of the Deputy Director.

13. Any alterations in the main circuit boundaries once approved should be taken up for scrutiny only after the prior approval of the Joint Director of Survey and Land Records.

14. He should scrutinise the annual reports relating to verification of the conditions of G. T. Stations sent by the Collectors with reference to the Survey of India Pamphlets and report to the Deputy Director of Survey as to whether all the stations in the District have been duly inspected and reports have been received.

15. He should maintain the Survey of India Pamphlets containing the values and description of the G.T. Stations in the State to enable extracts being supplied to the Unit Officers, as and when required.

16. He should scrutinise the main circuit records received from the Survey Unit Officers with reference to the old records and point out discrepancies, if any, noticed and submit it with his report for approval by the Deputy Director of Survey. He will check up not less than 15 per cent of the Computation of traverse work of the Main Circuit.

17. He should scrutinise the projection sheets prepared by the Computors for the compilation of the Taluk and District maps with reference to the harmonized main circuit records and village traverse records and Survey of India Sheets. He will check up not less than 20 per cent of the work done-*vide* specimen working sheet in Chapter XXV.

18. He should scrutinise the graticule values (of the squaring of the latitudes and longitudes) required for the printing of the Taluk and District Maps. The graticule values are to be worked out with reference to the Auxiliary tables. He will check up not less than 15 per cent of the work done-*vide* specimen furnished in Chapter XXV.

19. He should arrange to supply extracts from the Nautical Almanac every year to all the Unit Officers during December, January of each year. He should watch the receipt of the result of the annual periodical on the observation of the Azimuth from the field Upper subordinates in the Survey Units.

20. He should examine the supply of extracts from the original traverse records. He will check up not less than 10 per cent of the work done.

21. He should arrange to mend old traverse records which are torn wherever possible and prepare duplicate copies on the orders of Deputy Director of Survey.

22. The work dealt with in the Sub-Sections of the computation branch are as follows:—

(1) Scrutiny of the proposals for the formation of main circuits with the sub-circuits received from Survey Units and giving instructions regarding alterations of the alignment of the M.C. line if any found during the scrutiny.

(2) Scrutiny of the main circuit traverse records received from the Unit Offices for passing and approval.

(3) Furnishing extracts of values and description of the G.T. station with G.T. Charts with reference to the synoptical volumes and Survey of India pamphlets to the Survey Units on requisition.

(4) Preparation of projection sheets for the Taluk and District maps.

(5) Working the graticule values on different scales and checking the values on the Taluk maps.

(6) Verification of periodicals relating to the report on the condition of protected G.T. Stations received annually from the respective Collectors.

(7) Working rectangular co-ordinate values for the 15' square corner values for the preparation of 1" traverse chart:

(8) Squaring of sheets for traverse plotting for the preparation of village map.

(9) Preparation of reharmonized traverse sheets in regard to the values of the village trijunctions.

(10) Preparation of abstract traverse for reharmonising.

(11) Reconciliation of areas of villages with reference to the area registers, taluk maps, village maps etc and entering the revised area in the area registers maintained.

(12) Furnishing particulars of area surveyed and unsurveyed to the Collectors, Director of Statistics, Madras, etc., for statistical purposes.

(13) Furnishing survey particulars regarding the year and nature of previous surveys as per Area Registers.

(14) Scrutiny of the Inter-State Boundary records attested by the representatives of both the Governments and received from the Collectors or Deputy|Assistant Directors of the Survey Units concerned for the purpose of ratification.

(15) Furnishing extracts from the joint verification sketches, traverse records, etc., for the Common State boundaries to outside offices on requisition.

(16) Maintenance of State Area Register and Taluk-wise area register.

(17) Examining the alteration traverse, etc.

(18) Examining the proposals, etc. in regard to the adjustment of errors in distances for the villages, etc., received from the Unit Offices.

(19) Mending the old traverse sheets which are torn and substituting figures.

(20) Attending the corrections, etc., consequent on the alteration of village, taluk and district boundaries in the concerned traverse records and area registers.

(21) Checking the diaries of computor-draftsman daily.

(22) Preparation of extracts from the traverse sheets of previous (original) Survey of the villages, main circuits, etc.

(23) Preparation of extracts from the traverse (offset) Field Books of previous (original) Survey of the village.

(24) Plotting sketches of Minor circuit fields with the help of traverse data, traverse offsets and Amin field Measurement Book for supply to the Revenue Department on requisition.

(25) Preparation of extracts of Nautical Almanac to be supplied to the Survey Unit Officers for reference during Computation of Azimuth Observation.

(26) Verification of Area Registers and Taluk map for indenting the records required.

(27) Verification of traverse records and litho maps of the villages for supplying the Traverse extracts, required for the various Survey Units.

(28) Receiving the records etc., from the record section after making necessary indents. Returning the records received for reference after completion of work.

23. The following registers are to be maintained in the Computation branch :—

(1) The State Area Register.

(2) The Talukwise Area Register.

(3) Register showing cost of miscellaneous items of work done for other states.

(4) Register of applications for supply of extracts from traverse records.

(5) Register showing the Common State boundary verification records.

(6) Progress register to watch the supply of extracts of traverse records.

(7) Periodical registers to watch the observation of Azimuth by the Upper Subordinates.

(8) Watching the reports from the Collectors regarding conditions of G.T. Stations.

(9) Register showing the proposals received for the formation of main circuits and then approved by the Joint Director of Survey and Land Records.

HEAD DRAFTSMAN.

24. The Head Draftsmen are in charge of the Drawing Branch of Central Survey Office, Madras. The drawing branch is divided into sub-sections each under the control of a senior computor-draftsman. The main duties of the Head Draftsman are described in the Rules 25 to 30 below. He is responsible for the correctness of the work done in the sub-section described in Rule No. 31(1) to (13).

25. The Head Draftsman is responsible for the proper distribution of work to the subordinates in his section and for the quantity and quality of the work turned out by them. He should be able to check up personally not less than 25 to 50 per cent of the work turned out by the subordinates generally.

26. He has to write up his diary for the work done each day and submit the same to the Deputy Director of Survey, before the 10th of the succeeding month.

27. He has to maintain the consolidated account and individuals ledger of instruments, books, furniture and other stores in the custody of the subordinates working in the drawing branch.

28. It is the duty of the Head Draftsman to see that (*i*) the maps received for publication are scrutinised properly by the subordinates working in his section, (ii) the maps are made fit for reproduction either by Vandyke or by Helio printing process as the case may be and (iii) the discrepancies pointed out during the scrutiny done by the subordinates are rectified and to put up the error lists with his remarks to the Technical Manager for orders.

29. He should take prompt action to prepare and to send test correction sketches for cases requiring verification in field and on receipt back of the test corrections to get the field corrections attended to in the maps. He will also maintain a register in the following form to watch the action taken in respect of the Test corrections sent outside the Central Survey Office and see that prompt action is taken in all cases.

District and Taluk.	V. Number and Name.	Date of orders in the T. C.	Date of preparation of T. C. sketches.	Date of despatch of the T. C. sketches.	Date of receipt of the T. C. sketches after correction.	Date of incorporation of T. Cs.
(1)	(2)	(3)	(4)	(5)	(6)	(7)

30. He must finally check up the maps before they are sent to Press for reproduction. He will check up 50 per cent of the work done in getting the map ready for reproduction and also the questionnaire form attached to the error list and attest the same.

31. The Drawing section is divided into sub-Sections dealing with the subjects as noted below:—

This sub-section attends to the following:—

(1) General technical work.

(2) Furnishing extracts of old survey numbers from the old survey records and maps.

(3) Furnishing particulars in regard to the validation of previous surveys with reference to the narrative reports and other available disposal files.

(4) Corrections in the original records and village maps (original and stock copies and copies in the Board's Office).

(5) References relating to Survey errors and other discrepancies noticed after survey.

(6) Maintenance of locality-war register by posting the information received from the District Unit Offices.

(7) Preparation and publication of town Survey and Street Survey records.

(8) Supply of extracts on applications received from private parties.

(9) Periodical redrawing and reprinting of ryotwari village maps.

(10) Compilation of the Taluk and District touring maps and revision and reprinting of the same periodically.

(11) Compilation of the State Map, Road Map, Wall Map and other miscellaneous maps and charts required by other departments.

(12) Scrutiny and publication of village map for the Surveys done by the Survey Units and checking of the monthly reports and map returns.

(13) Composing of types and typing of names and figures on all the maps produced and processed in the Drawing Branch.

32. The following registers shall be maintained in Drawing Section.—

(1) Register showing the cost of Miscellaneous items of work done for the other States.

(2) Register of Town Surveys.

(3) Register of Street Surveys.

(4) Register showing the cost of items of work done and chargeable to local bodies and other Departments.

(5) Register of bills for work done on behalf of local bodies and other Departments.

(6) Register for copy applications for copies and extracts of Cadstral Survey|Town Survey and Street survey records.

(7) Register showing particulars of reprinting of village maps.

(8) Register showing the year of publication of district touring maps.

(9) Register showing the year of publication of taluk maps.

(10) Register of programme of revision of District touring and Taluk maps.

(11) Register showing the changes in the names of villages, towns etc.

(12) Register showing the cost of work done for other States.

(13) Register of bills for the work done for other States.

(14) Register showing cost of work done for Tamil Nadu debitable to different heads of account.

(15) Register of bills for the work done for Tamil Nadu debitable to different heads of account.

(16) Register of work done for the various Departments cost of which is debitable to public service.

(17) Register showing village maps received from Survey Units for publication.

(18) Register showing the village maps sent to Photo-Zinco Pres-

SENIOR COMPUTOR-DRAFTSMAN.

33. Each one of the sub-sections in the computation and drawing branch will be in the charge of a Senior Computor-Draftsman and the typing section under the charge of the Head Typographer.

34. The Senior Computor-Draftsman or the sub-section heads have to final the records and maps prepared in their sub-sections before they are issued for printing final copies and to bring to the notice of Head Draftsman and the Technical Manager any omissions or discrepancies noticed. The Sub-section Heads are responsible to maintain the registers prescribed up-to-date and they should put them up for check to the Head Computor or Head Draftsman, Technical Manager and Deputy Director of Survey, Central Survey Office, on due dates. They will be assisted in the maintenance of the Register by a Draftsman deputed for the purpose. They will check up 100 per cent of the work done by the subordinates.

35. The Sub-section heads are responsible for the records and maps received in their section and they should see that those that are no longer required are returned to the record-keeper promptly. They have to write up a diary showing the work done for each day and submit the diaries daily to the Head Draftsman or Head Computor as the case may be and to the Technical Manager once in a week.

36. The diaries of the Computor Draftsman should be checked each day and submitted to the Head Draftsman or Head Computor as the case may be and to the Technical Manager once in a week. The diary should be put up to the Deputy Director for passing the same on or before 10th of every month for the previous month.

HEAD TYPOGRAPHER.

37. The Head Typographer is in-charge of the Hand Composing and printing Section attached to the Drawing Branch.

38. He is responsible for the neat and prompt execution of the printing done on the maps and records prepared in the Drawing Branch. He should test the quality and quantity of work daily.

39. He should write up his diary daily and submit the same daily to the Head Draftsman for check, besides maintaining the following registers :—

(1) Register showing the miscellaneous work done (Tamil Nadu).

(2) Register showing the redrawing of village maps (Ryotwari villages-Tamil Nadu).

(3) Register of redrawing of village maps of Estate Survey work (Tamil Nadu).

(4) Register of redrawing of village maps of Estate Survey work (Andhra Pradesh).

(5) Register showing the miscellaneous work done for Andhra Pradesh.

(6) Register showing the cost of work done for Andhra Pradesh (Estate Survey).

(7) Register showing the programmed work done in District Touring, Taluk and Town Maps etc.

JUNIOR COMPUTOR-DRAFTSMAN.

40. The Junior Computor-Draftsman should write up a diary for the work done each day and submit the same to the sub-section head for check on the same day.

TYPOGRAPHER.

41. The Typographer Grade I and II should write up his diary for the work done each day and submit the same daily to the Head Typographer for check.

42. The instructions in regard to the procedure for keeping the types clean and use of Tripod Machines detailed in Appendix No. XXIII should be strictly followed.

MECHANIC AND THE ASSISTANT MECHANIC.

43. The Deputy Director of Central Survey Office shall be the appointing authority for the posts.

44. The Mechanic and the Assistant Mechanic have to check the instruments supplied by the firms before they are distributed as per the indents.

45. They have to attend to the overhauling of the theodolites and circumtetaners and attend all minor repairs to all the Survey instruments as far as can possibly be done in the Central Survey Office.

46. They will also assist the Parcel Clerk and the Store-keeper in packing articles or unpacking packages.

47. The Machanic will also maintain the following registers :—

(*a*) Register of Examination reports for theodolites.

(*b*) Register of Theodolites, etc., repaired in Central Survey Office.

(*c*) Stock Book of Tools and

(*d*) Theodolite spare parts register.

ACCOUNTS SECTION.

48. A Superintendent of the Ministerial Service is placed in charge of this section.

This Section deals with all cash transactions relating to drawal and payment of pay and allowances of all the staff in Central Survey Office, preparation of pension papers, all establishment matters including grant of leave, sanction of increments, declaration of probation and maintenance of service registers, watching the payment of cost towards work done or maps supplied on cash bills, watching the adjustment of cost of work done in the Photo-Zinco Press or maps supplied to Government Departments on adjustment, bills, sanction and recovery of Provident Fund advance, etc.

49. The duties of the Accountant or cashier of Central Survey Office are dealing with cash including maintenance of cash book and other subsidiary registers and preparation of contingent bills (including endorsed bills) etc. He should deposit a cash security of Rs. 500 and execute necessary bond as prescribed in M.F.C. Volume I.

50. As this is an office situated in the city all the bills are subject to pre-audit by the Pay and Accounts Officer and payment received by cheques to be cashed at the Reserve Bank.

51. The Registers maintained in this Section in addition to the personal and Periodical Registers are given below :—

(1) Cash Book.

(2) Daily contents of cash chest.

(3) Register of cheques received.

(4) Register of Bills sent.

(5) Register of miscellaneous payments and receipts.

(6) Permanent advance book.

(7) Contingent Register.

(8) Disbursing Officers Register.

(9) Register of undisbursed salaries.

(10) Printed receipt Book.

(11) Register of Bills sent to Pay and Accounts Office (Bill register).

(12) Subsidiary Treasury Bill Register.

(13) Subsidiary cash register (Co-operative Society).

(14) Subsidiary cash register (Salary Saving Scheme L.I.C. of India).

(15) Subsidiary cash register (CTD)

(16) Register of audit objections (PAO).

(17) Register to watch expeditious settlement of audit objections of Accountant-General.

(18) Security Register. Volume I Valuables.
Volume II Security Deposits.
Volume III Security bonds.

(19) Register of acquittance rolls.

(20) Remittance register.

(21) Register of pension applications and notice issued.

(22) Register of T.A. Bills received.

(23) Ledger of T.A. bills to avoid double claim.

(24) Register of Tour advance paid and recovered.

(25) Tour advance of Bill register.

(26) T.A. Bill register and Acquittance register.

(27) Register of Handloom advance sanctioned and watching of recovery.

(28) Register of Handloom Bill register.

(29) Khadi advance watching register and Sales Emporium watching register.

(30) Khadi Adjustment register.

(31) Increments Register.

(32) Seniority Register of Press personnel.

(33) Register of Service Books.

(34) Register showing the permanent address of subordinates of Central Survey Office.

(35) Adjustment bill register.

(36) Cash bill Register.

(37) Register of chalans received.

(38) Register of Bills received for counter signature.

(39) Refund bill Register.

(40) Allowance and Honorarium Register.

(41) General Provident Fund Ledger.

(42) Order Book.

(43) Funds Advance Book (bills).

(44) Postal Life Insurance Ledger.

(45) Register of persons debarred from Government Service.

(46) Register of reservation of appointments.

(47) Deputation Register.

(48) Register of probationer.

(49) Register showing the free chance availed of by the staff for the Special tests.

(50) R. P. B. and supplemental Bills.

(51) Register of L.P.C. outgoing.

(52) Register of L.P.C. received.

(53) O.B.A.|Pay and T.A. recovery watching register.

(54) O.B.A.|Pay and T.A.O.|C. Bill Register.

CORRESPONDENCE AND STORE SECTION.

52. This Branch comprises of the following sections.

(1) The General correspondence section.

(2) Stores Section.

CORRESPONDENCE SECTION.

53. This section is generally in the charge of an Assistant who is designated as the Head Clerk.

54. It is the duty of the Head Clerk to see that the following items of work are attended to promptly and properly:—

(1) To the proper distribution of the Tapals.

(2) Fair copy and despatch of the correspondence issued by the office.

(3) Proper maintenance of the disposal files records under the Tottenham system relating to the correspondence of the entire office.

(4) Receipt of the articles received by Railway Parcel from out-side offices and distribution to the concerned section.

(5) Receipt of telephonic messages from outside offices and issue of such messages to the outside offices.

STORES SECTION.

The Superintendent will inspect the Stores and Records periodically to see that actual balances and Book balances agree and report cases of disagreement for action immediately.

55. The Stores Section of Central Survey Office is in the charge of the Store-Keeper in the grade of an Assistant assisted by Junior Assistants.

56. The Store Keeper has to deposit a sum of Rs. 500 as cash security and execute necessary bond as prescribed in M.F.C. Volume I.

57. He will be given a permanent advance of Rs. 80 to meet the petty contingency charges. He will be sanctioned additional temporary advances as and when absolutely necessary for the cash purchases of articles such as cotton waste, etc. These should be recouped without any delay.

58. The following registers will be maintained in the Stores Section, besides the personal and periodical registers:—

Stock Book of Inks and Varnish.

Register of Rollers.

Register of purchases made.

Stock Book of stores.

Stock Book of furniture.

Register of articles supplied to survey units.

Register of unserviceable articles.

Register of Bulbs.

Register of cycles.

Register of cost recoveries made, etc.

Register of firms.

Register of individual ledger.

Register of orders placed for supply of survey instruments on contractors.

Register of Inventory of Furniture.

Stock book of Stationery articles.

Stock book of Stationery Papers.

Stock book of Bazaar articles.

Register of local purchases made.

Register of articles supplied on loan to outside offices.

Register of loan received from outside offices.

Stock book of Survey forms.

Stock book of Common forms R.F. Group.

Stock Book of T. and A and M.T.C. Forms.

Stock book of Books.

Stock Book of common covers, etc.

Register of books received.

Register of Books, etc., issued.

Register of correction slip received and issued.

Issue register for Library Books.

RECORD SECTION.

The Record Section of the Central Survey Office is in-charge of an Assistant with a special pay of Rs. 10|- p.m. He is called the Record Keeper and he is assisted by Junior Assistant dealing with subject as follows :—

(i) Distributing the printed village maps, taluk maps and District Touring maps and State maps.

(ii) Stocking the Street Survey records, town Survey records, Land complaint files, outline maps of the Districts and States and accounting for the same.

(iii) Obtaining the original survey records from the Office of the Tamil Nadu Archives, supplying them to the officers undertaking resurvey operations, etc., and getting them back after necessary action for return to the Tamil Nadu Archives.

(iv) Receipt, maintenance (including originals) and issue of different kinds of District Touring Maps and state Maps. Outline Maps, Special Maps, Survey of India Topo Sheets, etc.

(v) Receipts, issue and watching the return of all Miscellaneous Records, such as Traverse records, L.C. files, 9 (2) Acknowledgment Registers, etc. All village maps are received from Press in this Section and then distributed to the different seats.

(vi) Receipt, issue and watching the return (wherever necessary) maintenance (including originals) of all village maps.

(vii) Receipts, maintenance (including originals) issue and watching the return (wherever necessary) of all the maps and records relating to Municipal Towns and Panchayats surveyed under the Street Survey System.

(viii) Supply to various departments of the Government free of cost, maps of different types on the scale as laid down by Government.

(ix) Receipt, maintenance (including originals) and issue of Taluk maps for all the Taluks in the State.

The following registers will be maintained in the Records Section besides the personal and periodical registers :—

DISTRICT, TALUK AND MISCELLANEOUS MAPS.

1. Cost register of maps supplied free to Government Departments.

2. Cost register of maps sold to Government Departments and Public.

3. Catalogue of maps.

4. Register of maps reprinted and revised.

5. Invoice numbering registers.

6. Register for restricted maps
   (i) Survey of India Sheets.
   (ii) State Survey Maps.

7. Register of Physical Verification of Record.

8. Record condition Inspection register.

9. Register of restricted maps supplied to Sections.

10. Register of records issued to outside offices and received.

MISCELLANEOUS RECORDS.

(1) Register of records received from and returned to Tamil Nadu Archives.

(2) Register of records received and returned to offices other than Tamil Nadu Archives.

(3) Register of records issued to Drawing Branch.

(4) Register of records issued to other offices.

(5) Catalogue of records received from field (Village and Road Surveys).

(6) Catalogue of records (Estate Survey).

(7) Catalogue of Frontier boundary records.

(8) Register of 9 (2) acknowledgments.

(9) Catalogue of L.C. Files.

(10) Register showing the reminder sent for the return of records pending in outside offices (Extract of A.R. Register)

(11) Invoice numbering register (To watch the acknowledgments).

(12) Permanent register of village records.

(13) Records condition Inspection Register.

VILLAGE MAPS.

(1) Cost register of maps sold to Government Departments and Public.

(2) Register of records received from and returned to Tamil Nadu Archives and Board.

(3) Register of records issued to Drawing Branch.

(4) Register of records issued to other offices.

(5) Catalogue of maps.

(6) A.R. Extract register.

(7) Invoice numbering register.

(8) Records condition Inspection register.

(9) Register for physical verification of records.

TOWN AND PANCHAYAT MAPS.

(1) Register of records issued to other Offices.

(i) Town.

(ii) Panchayats.

(2) Catalogue of maps (Saleable copies).

(3) Register of 9(2) acknowledgements (Town and Panchayats).

(4) Register of L.C. files received.

(5) Register showing reminder sent for the return of records pending with outside offices (extract of A.R. register).

(6) Register showing originals

(i) Towns.

(ii) Panchayats.

(7) Register of records issued to Drawing Branch.

(8) Register of records received from and returned to Tamil Nadu Archives.

(9) Register of records received from and returned to outside offices.

(10) Invoice numbering register.

(11) Cost register (Free).

(12) Cost register (for cash or adjustment).

(13) Register of maps reprinted.

(i) Towns

(ii) Panchayats.

(14) Register of restricted maps.

Free supply as per G.O. No. 502, *Revenue, dated* 10*th February* 1958.

Register regarding free supply of maps—

(1) District Touring maps.

(2) Taluk maps.

(3) State maps.

PARCEL AND SALES BRANCH.

5. The parcel clerk is attached to the Correspondence Section. He should attend to the despatch of parcel of articles sent to outside offices by railway or lorry service and to take delivery of parcels sent to the Central Survey Office by other officers.

6. The articles for despatch are to be entered in the Register of parcels received from the sections for despatch to outside offices by the subject clerk who should note the invoice or A.R.No. for the articles. The Parcel Clerk should check the articles, receive them and attest the entries made by the subject clerk.

7. The parcel Clerk should then pack the articles and despatch them to out stations by Parcel either by Railway or by approved lorry service. Parcels to be delivered through Messengers to Local offices should be entered in the local delivery book, in which the acknowledgment is also to be obtained.

8. The packing materials required for the parcels are to be indented for by the Parcel Clerk, through the Head Clerk and the articles obtained from the Store Keeper after they are passed by the Superintendent.

9. The particulars of the Railway and Lorry receipts for parcels despatched should be noted in the Register of Parcels despatched. The receipts should then be despatched to the concerned officers by Registered post by the Parcel Clerk himself.

10. The Parcel Clerk should receive the Railway or Lorry receipts, received from outside officers, from the Head Clerk. He should enter the particulars of the Railways receipts in the Register of Parcels received from other stations.

11. He should arrange to take delivery of the articles and distribute them to the concerned sections obtaining their acknowledgment in the register of parcels received.

12. The freight charges for parcels received in the Central Survey Office will be paid for by the Store keeper on proper vouchers and accounted for by him.

13. Conveyance charges to and fro from the Booking Offices for the articles despatched and for those received will be paid by the Store Keeper under the orders of the Superintendent on vouchers produced.

14. The Parcel Clerk will be given service postage stamps to the value of Rs. 10 for the despatch, by Registered Post, of Railway Receipts and other articles. He should maintain an account of the stamps received and expended and produce the account for periodical check, and obtain from the Head Cleark further apply of stamps as and when his stock is exhausted.

15. The Parcel Clerk should watch the receipt of acknowledgments for articles sent by him by registered post acknowledgement due.

16. The Parcel Clerk is in-charge of Sales to Public, on cash payment, of the maps available for sale in Central Survey Office.

17. On receipt of demand for a map, the Parcel Clerk should send an indent to hte Record keeper in he Rough Indent Book maintained by him, obtain the maps and acknowledge receipt in the catalogue. He must return to the Record-keeper on the same day any maps that are not sold and obtain the acknowledgment of the Clerk concerned.

18. On receipt of the map he should prepare a cash bill noting the year of print, its scale, number of sections and the cost and hand over the map to the Party, on receipt of the cost obtaining his acknowledgment in the bill itself.

19. Before the cash is closed each day he should send the cash bills for the maps sold, together with his rough indent book to the Record Keeper, who will check entries in the cash Bill, certify on the bill as to its correctness and return both the cash bill and the indent book to the Parcel Clerk.

20. The Parcel Clerk should then send the cash to the Accounts Section along with the Cash Bill Book and the Day Book. The Accountant will receive the cash and note the R.M.P. number in the Cach Bill Book and the Day Book. The register of Miscellaneous payments, the cash bill book and the day book should be sent by the Accountant to the Superintendent for attestation in all the books. The Bill Book and the Day Book should then be returned to the Parcel Clerk. The Bill Book and Day Book should be checked and attested while checking the cash transactions every day.

21. He will maintain the following registers :—

(1) Register of packages received from other stations.

(2) Register of parcels received and sent to outside offices.

(3) Day Book.

(4) Bill Book.

CHAPTER XXII.

DRAWING, PRINTING AND PUBLICATION OF MAPS

1. The maps prepared by the Tamil Nadu Survey and Land Records Department are printed and published in the Central Survey Office. The maps are also periodically revised, reprinted and published.

2. The chief items of work done in the Central Survey Office are :—

(i) Printing of village maps.

(ii) Compilation and printing of the Taluk maps, District Touring maps and Atlas of district maps and State Wall maps.

(iii) Printing Town Survey and Street Survey records.

(iv) Compilation and printing of special maps, viz., Road maps, Outline maps, etc.

(v) Revision and printing of village, taluk and district touring maps, road maps, wall and town maps, etc.

(vi) Printing maps for other departments, eg., Block Developments, Crime Chart maps, Scheme maps, Statistical Atlas, Election maps and Community Development maps, etc.

(vii) Printing of University Certificates and diplomas and graphs and charts for Police Administration and areas square papers, etc.

VILLAGE MAPS.

3. As soon as the village maps are received in the Central Survey Office from the Survey Units, the maps are scrutinised to see whether the maps have been prepared in accordance with the rules and as to whether they are suitable for reproduction by Vandyke or the Helio process.

4. The maps are printed to scale 16 inches= 1 mile (1 m.m. : 5,000 m.m.) or 8 inches= 1 mile (1 m.m. : 10,000 m.m.) according to the area of the village is less than 15 square miles (40 square kilo-metres) or more. A report on the final examination of the village maps in Survey Form No. 103 is to be filled up by the Draftsman examining the maps which will then be finalled and error-passed by the Senior Draftsman, in charge of the section, Head Draftsman, the Technical Manager and the Deputy Director. Test correction sketches should be prepared and sent to the concerned Field Section Officer for rectification of any discrepancy noticed in the Field.

5. The Proofs of the village maps received from the Photo-Zinco Press should be examined and returned after verification for striking 75 copies required for supply as ordered is G.O. No. 2210, Revenue

Department, dated 21st August 1951 and G.O. No. 502, Revenue Department, dated 10th February 1958 (Printed as appendix No. XXXII).

The precautions to be observed in drawing, inking and typing on maps required to be printed by the Vandyke process and instructions for the typing work in general are printed as appendices No. XIX and XXIII.

6. The originals of the Taluk maps are compiled to scale 1 inch =1 mile (1m.m.: 50,000 m.m.) The main circuit traverses have to be harmonised with reference to a selected District Origin, Supplemental traverses are then harmonised along village boundaries falling within the main circuit. By this means, the rectangular co-ordinates of each Village trijunction point are obtained with reference to the selected origin.

The number of sheets required for the Taluk Map will be determined with reference to the latitude and longitude contained in the taluk.

The village trijunctions are then plotted to scale 1" = 1 mile (1 m.m. : 50,000 m.m.) on suitable drawing paper exactly as in the case of traverse plot of a village.

7. The rectangular co-ordinates of the four corners of the 15' square are also computed from the selected origin and plotted. The corners are hen joined to form a "square" and smaller 5' squares are formed within it by subdivision of the outer meridional and longitudinal lines and drawing of interior meridional and longitudinal lines.

These lines and the plotted stations are inked in blue.

8. Meanwhile the maps of the included villages, which are generally on the scale 16" or 8" = 1 mile (1 m.m. : 5,000 m.m. or (1 m.m. : 10,000 m.m.) are reduced by pantagraph to the scale 1 inch = 1 mile (1 m.m. : 50,000 m.m.). The village boundary marks and all topographical details except unimportant ones, such as wells and ponds should then be shown in the pantagraph reductions. The names of villages and hamlets and important topographical names should also be written. The village boundary lines should be shown in black ink. The number and name of the village, taluk and district and the year of publication of the map from which the reduction was taken should also be noted for reference. The inking done should be compared by another draftsman.

The village map reductions are to be superimposed on the skeleton outline shett and fitted into the village trijunction points plotted in it after effecting any small adjustments that may be rendered necessary

by shrinkage of the litho maps or slight in accuracies in the original drawing of he maps, etc. Any large adjustments that may be necessary should be examined and cause of the error, investigated for necessary correction.

10. As each village map reduction fits into the points the village boundaries and details are traced on the skeleton sheet in blue. For this purpose a piece of paper rubbed with blue chalk on one side which should be in contact with sheet is inserted underneath the reduction and the details on the reduction run over with a pin.

11. In cases in which the draughtsman who does the above work entertains doubts about the accuracy of the maps or the plotting of the points, etc., he reserves them for the decision of the officer, noting them in the compilation book which he maintains for the purpose.

12. The officer examines all doubtful cases, tests the accuracy of (1) the pantagraph reductions, (2) the plotting of points, and (3) in rare cases the computations on which values of points in doubts are based, and decides how the details should be drawn.

13. The officer, likewise, decides on how disconnected stream and road details should be drawn with reference to the village maps what footpaths should be deleted, etc., on reports on these matters contained in the compilation book of the draftsman who will have inked, in the meantime, all boundaries and all such details about which he has no doubts.

14. The rough sheet thus compiled will then be completed in detailing. Each item of detail will be done in a distinguishing colour to facilitate drawing of the fair sheet, streams and tanks are done in blue, roads and sites in red and reserved forest boundaries in green.

The rough sheet is then photo enlarged to the $1\frac{1}{2}$" = 1 mile (1 m.m. = 40,000 m.m.) scale and transferred to plate.

A light blue print is then taken from the zinc plate on a fresh sheet of drawing paper. This print serves for the drawing of the fair original.

15. The details, etc., on the blue will be drawn for reduction with reference to the rough original, referred to in rule 14 supra as the guide and names and reference numbers, etc., typed thereon Village boundaries should also be inked.

16. *Ink to be used.*—The best ink to use is Indian ink. It should be freshly prepared every day, and must be sufficiently thick to give a good jet block line. The ink should be rubbed up until it is sufficiently black and rubbing continued for five or ten minutes longer.

17. *Inking the lines.*—The lines should be firmly and clearly drawn not too fine or more too close togeher. In drawing for reduction, every line must be exaggerated in proportion to the amount of reduction intended. For reduction to half scale, the lines must be exactly twice the length and thickness as they are required to be when reproduced.

Similarly, the spaces, between lines of shading and cross-hatching must be proportionately wider; otherwise, when reduced, they will run together and block up.

For drawing parallel lines such as roads and canals, a road pen should be used. When several lines of uniform breadth have to be drawn in the case of tanks, Marquois scales should be used.

18. Names and other letter-press matter may be either printed direct on the drawing with a typing machine, Southampton pattern now in general use in the department, or the printing may be done by cutting out and pasting in position on the drawing, slips of paper on which the names, etc., are typed. The first method requires a considerable amount of skill and experience on the part of the typographer. The second method, viz., that of pasting on typed slip of paper, has no doubt this advantage, viz., that a mistake made can be easily rectified by removing the slip and pasting another but unless the typed slips are of very thin paper, their edges throw a shadow which is reproduced in the negative and has to be "duffed" out. The paper used for slips should, therefore, be very thin and of exactly the same colour as that of the original. This method may be resorted to where the matter to be printed is lengthy.

19. *Types to be used.*—The types should be carefully selected so that they may give letters of exactly the required size when reduced. The types should not contain fine up-strokes, as these when reduced disappear altogether or are broken and indistinct and require a great deal of touching up on the negative. The printing types to be used are given in the specimen reference sheet printed as Appendix No. XXXV.

20. *Spelling of names.*—The spelling names should be in strict accordance with that laid down in the "Reference Book" of 1917.

For names not found in that book, reference should be made to the latest alphabetical list published by the Director of Stationery and Printing, Madras. The spelling of Great Trigonometrical Stations should follow that given in the Synoptical volumes of the survey of India.

21. *Passing printed slips.*—Thus work should begin only after all the details in the map have been inked.

The names of villages should, as far as possible, be typed or the slips containing the names so pasted that they may not extend beyond the village boundary, and the village number should be typed in the

middle of the village as far as possible. The names of villages should invariably begin or end close to the sites to which they belong. They should, be typed due east and west.

22. Where railway stations bearing the names of villages be close to the village site, the letters R.S. alone need be pasted or typed close to the station symbol.

23. As regards post offices, police stations, bungalows, etc., if their exact positions are known the slips with letters or symbols denoting them should be typed or pasted in such positions; otherwise, the slips should be typed or pasted close to the names of the villages concerned.

24. In typing or pasting the names of the rivers, etc., the total length of their course through the taluk should be taken into consideration. The name should be typed or pasted parallel to the course. If necessary, the name may be inserted at convenient intervals in one or more conspicuous places. When a river crosses the boundary of the taluk the name should also be shown outside the limits of the taluk.

25. The names of towns from and to which roads, etc., lead should be typed, facing the north point.

26. The names of the adjoining taluks, Districts etc., should be typed or pasted letter by letter symmetrically across the whole space available.

27. In pasting or typing whole names or letters in the map, care should be taken to see that they are not cut in two when the map is divided into sections for photo reduction.

28. Should there be no room for any names in the body of the map, they should be numbered and the names as well as numbers shown typed in the margin in a table of reference.

29. The graticule lines should be inked after the values furnished by the computing section are checked. The graticule values of the latitude and longitude squares or for any required scales of the map (which are necessary for photographic reduction and printing of the taluk maps) are worked out with reference to the tables available in the Auxiliary tables.

TALUK MAPS—ORIGINAL COMPILATIONS.

30. *Heading and reference.*—The heading and reference should be added to the map in any convenient portion or portions of its blank space. The heading should be preferably be at the top north-west corner of the map.

The heading should show the names of the district and that of the taluk, the alter in a bigger type than a former. Below the name of the district should be inserted the scale of the map with the representtative fraction, and next to it, the scale itself should be drawn to read to miles and furlongs (kilometres). A flyslip with the scale and representative fraction of the indended reduction typed on it, should be pasted over the scale of the map in such a way that the latter may be easily read by slightly lifting up the fly-slip. The area of the taluk in square miles (square-kilo metres) should form the last item in the heading.

In the reference should be shown only those items of the standard reference sheet, Appendix No.XIV, which occur in the body of the map. They need not be numbered as in the standard sheet, but they should follow the order in which they are arranged in that sheet.

31. *Foot-notes.*—At the lower right hand corner of the map, below the border line will be entered the nature of the print whether photoprint or photozincograph and the year of publication, also the price of the print, coloured and uncoloured. The register number and the number of copies to be printed will be entered at the lower left-hand corner. Under the border line, and at the centre will be entered the name of the officer under whose direction it is published. At the lower right hand corner in the map below the border line, the name of the officer under whose superintendence the map is compiled and printed will be entered.

32. When the drawing is thus completed, it will be finally examined by an experienced Junior Computor-draftsman and finalled by another senior draftsman. Discrepancies and omissions noticed will be rectified by the comparer and finaller. The map should then be scrutinised by the Head draftsman and the Technical Manager and sent to the Photo-zinco press for preparing six cyano type copies to be sent as proofs after obtaining the orders of the Deputy Director.

33. The several details in the proof copies (Cyano type Copies) should be shown in distinguishing colours. The rivers and tanks will be coloured in blue, forests in green, national and State highways in red, and electric transmission lines in purple. The coloured copies should be compared by a Draftsman.

34. One proof copy will be sent to the Railway Department for verification of Railway stations and alignment of railway lines, another copy to the District Forest Officer for verification of the forests and three copies to the District Collector. (One to be referred to the Local Executive Engineer, P.W.D., another to the Divisional Engineer

Highways Department and the third to the Revenue Divisional Officer concerned) for verification of irrigation sources, roads and travellerss' bungalows. One office copy of the proof is to be kept in the file.

While sending proof copies to the various officers, a list of discrepancies if any, noticed in the Central Survey Office should also be sent along with the proofs with a request to verify and report.

35. After the proofs, verified by the local officer in respect of the details concerning them, are received back by him, the Collector will make such corrections, alterations and additions as he himself considers necessary and will return it to the Survey Office with a list of corrections made by him.

36. If the corrections made in the two proof copies thus verified are such as can be carried out on the negative themselves, they are altered in the photographic room and also in the original map, but the map is not re-photographed. The original map will then be examined and finalised by the Head Draftsman, the Manager (Technical) and the Deputy Director. If, however, the corrections are many, the original map is correctly re-photographed, and proofs taken as before.

37. The original map processed should be sent to the Photo Zinco Press for printing seven sets of grey prints to prepare colour guides and one light blue print to prepare the hill original after obtaining orders of Deputy Director. These should be on scale one inch = 1 mile (1 m.m. = 50,000 m.m.). As many guides should be prepared as there are colours. The colour guides should then he compared with reference to the original map and pantagraph sketches.

38. The hill contour lines available in the Survey of India sheets ("1 = 1 mile) at intervals of 50 feet (20 metres) should be traced. square by square either at 50 feet (20 metres) or 250 feet (100 m.) intervals as required and this tracing is to be utilised for preparing the Hill original. The counter lining at the required intervals is done for the village boundaries and details. The height of the peaks and the points indicating the heights of the peaks which are noticed in the Survey of India sheets should also be marked at the proper places in the light blue print. The contour lines at intervals of 50 feet (20 metres) 250 feet (100 metres) should be inked in thin lines, while the contour lines indicating 1,000 feet (400 metres), 2,000 feet (800 metres), etc., are drawn in thick lines. The Hill original should then be compared by a Senior Draftsman and checked by the sub-section Head Draftsman, Manager (Technical) and the Deputy Director.

The colour guides and the Hill originals should be sent to the Press for supply of the combined colour proof for verification in the Drawing Branch.

39. On receipt of the combined colour proof it should be examined by a draftsman with reference to the individual colour guides, the original taluk map and the Hill Original. Corrections noticed, if any, should be marked in red ink with necessary remarks for the information of the Press.

The combined colour proof should then be checked by the sub-section head, Head Draftsman, Technical Manager and the Deputy Director and sent to the Press for striking copies.

If there are too many corrections, a second proof of the map incorporating all the corrections pointed out in the first proof should be obtained and checked again in the Drawing Branch before the Deputy Director issues 'Strike' orders.

40. After the proofs have been finally examined by the Head Draftsman the Manager (Technical) and passed by the Deputy Director (see form old No. 129) the required number of copies which under existing orders is 350 are printed. The Record keeper should take action to distribute the maps according to the scales laid down in G.O. No. 2210, Revenue, dated 21st August 1951 as amended by G.O. No. 502, Revenue, dated 10th February 1958 *vide* Appendix No. XXXII. The extra final copies received in the Drawing Branch along with the Original should be kept as reference copies in the section. The original should be returned to the record section for safe preservation.

41. The instructions given above will apply mutatis mutandis to the compilation and printing of District Touring maps. The essential points of difference are noted below :—

(1) The original of the District Touring Map should be drawn on scale 1″=2-2|3 miles for 2|3 reduction to the scale 1″=4 miles except in the case of the Nilgiris and Kanyakumari Districts where the original will be drawn to scale 1"=1-1|3 miles for 2|3 reduction to the final scale of 1"=2 miles.

(2) The projection sheet should be prepared on scale 1" = 2-2|3 miles or 1" = 1-1|3 miles, as the case may be, the size of graticule being 30' in latitude by 30' in Longitude.

(3) On this projection are plotted (i) All G.T. and Madras Survey Trigonometrical Stations.

(ii) all Taluk trijunctions.

(iii) Village trijunctions at the rate of one for every 50 sq. miles projected on a sheet of paper with graticules of 30' already plotted therein.

(4) The original Taluk maps on scale $1\frac{1}{2}$" = 1 mile are reduced $\frac{4}{7}$th to the scale 1" = $2\frac{2}{3}$ miles and blue prints of these reductions are obtained from the Press, on this white paper along with a copy on an oil tracing paper to facilitate a check of the points inserted in it. These prints serve the same purpose as the 1" Village pentagraph sketches do for the compilation of the Taluk Map.

(5) In the Taluk blue prints obtained to scale 1" = $2\frac{2}{3}$ miles all the points mentioned in sub-para (3) above, are noted in black; so also all the details which should appear in the District Touring map, viz., all those shown in the standard reference sheet, Appendix No. XIV except—

(i) Village boundaries and number;

(ii) Hamlets which are not covered in the reference sheet;

(iii) Foot paths other than those in hilly tracts;

(iv) Unimportant streams; and

(v) tanks less than 1|4 sq. miles in extent.

(6) As the contours are not shown in the District Touring maps, the preparation of the Hill original as in the case of the Taluk map is not necessary.

42. Specimens are appended to represent the Taluk map as drawn on the scale $1\frac{1}{2}$"=1 mile and as reduced to Scale 1"=1 mile and also to represent the District Touring maps drawn to scale 1" =2-2|3 miles and reduction to scale 1"=4 miles after 2|3 reduction vide Appendix No. XXXIII.

DISTRICT ATLAS OF TAMIL NADU.

43. The District Atlas is a collection of all the District Maps printed on a paper of uniform size 500 m.m., 1,000 m.m. and kept bound in one volume. This is prepared mainly for the use of Government offices.

44. The district maps are generally printed on different scales, namely 1"=4 miles or 1"=2 miles (1 m.m : 2,50,000)or(1 m.m.: 1,25,000 m.m.) according to the size of the district. From the originals of these district maps, light blue prints, for each district should be obtained on drawing sheets from the press. These light blue prints will be utilised for the preparation of original State Atlas.

45. The procedure followed for the preparation of the fair originals of Taluk and District Touring Maps should be followed in this case also. The details are shown in the original in accordance with the standard reference sheet printed as appendix No. XIV.

46. After the preparation of the original is completed, they should be examined by the Senior Draftsman, Head draftsman and Technical manager and then sent to the Head computor for furnishing Graticule Values. As the originals will be on different scales and sizes, they should be reduced to the prescribed size of the Atlas. The originals will be sent to the Press, for the supply of grey prints for preparing colour guides and one light blue print on drawing sheet as hill roiginal after necessary reduction as in the case of Taluk and District Touring Maps, after obtaining orders of Deputy Director. The individual colour guides and hill originals should be prepared and sent to the Press for the supply of the combined colour proof.

47. The corrections, if any, noticed should be marked in the combined colour proofs in red ink and sent to Press for final printing.

48. The final copies will be received by the Record Keeper in loose sheets. He should take necessary action to send the required number of copies to the mounting branch, to be stiched in book form with suitable wrappers.

STATE WALL MAP.

49. The State Wall map is the only map of the State published by this Department for use by the various Departments to mark their administrative details.

50. The original should be prepared on the scale 1 "=4 miles for publication on the scale 1 "=8 miles after reduction by half. In the metric system, the original will be in scale 1 m.m.=2,50,000 m.m. and the final map after 1|2 reduction will be on the scale 1 m.m.= 5,00,000 m.m.

51. The originals of the District Touring Maps should be reduced to the Scale 1"=12 miles (1 m.m. : 7,50,000 m.m.) by photo reduction and black prints on bank post paper or other durable and thin paper should be obtained. This will serve the same purpose as the pentagraph sketches for the compilation of the taluk map.

52. A projection sheet with graticule lines with 1 degree squares and with District Trijunction points and G.T. stations duly marked should be obtained from the computation section. In the projection sheet, the reduced sketches of District Maps should be inserted as in the case of compilation of District Touring and Taluk maps. Only the details that are required such as roads, village sites, rivers, etc., are to be inserted. The general procedure for the preparation of taluk and touring maps will apply to this. The details shown in the reference sheet printed as Appendix No. XIV should be shown in the original.

53. After completion of the original, this should be examined by a Senior Draftsman, Head Draftsman, the Manager (Technical) and by the Deputy Director, and sent to the Press for supply of grey prints for the preparation of colour guides and one light blue print on drawing sheet for the preparation of hill original.

54. The hill original should be prepared by tracing contour lines from the Survey of India sheets, on scale 1" 4 miles. This should be sent to the Press for obtaining L.B. print on scale 1"= 16 miles by 1|4 reduction on thin paper. Inserting and inking of the contour lines is the same as in the case of the Taluk maps.

55. When the colour guides and hill originals are completed, they should be sent to Press for the supply of combined colour proof, which, on receipt should be examined with reference to original colour guides and hill originals and omissions or additions should be neatly marked in red ink and returned to the Press for final printing. Before printing the final copies, corrections marked in the combined colour proof should be attended to in the negatives and plates by the Press.

56. 700 copies of the maps are printed and supplied to the Record keeper as per G.O. Ms. No. 1882 C.T. & R.E., dated 21st December 1976. The record keeper should send the paper copies wherever necessary to the mounting branch to be mounted on cloth and fitted with rollers. The cost of mounting and fixing up rollers should be added on to the cost of the map in such cases.

TOWN SURVEY RECORDS.

57. On receipt of the entire set of records from the Unit Office the records should be finally examined and errors noticed, if any, by the Draftsman during the finalling should be entered in Survey Form No. 118A. The errors thus recorded should be scrutinised by the Section Head, Head Draftsman, Technical Manager and the Deputy Director. All cases which require verification in field should be referred to the concerned party or Range Officers, enclosing correction sketches furnishing the particulars required. Discrepancies possible of rectification in Office should be rectified as per the Deputy Director's orders in the error list.

58. After rectification of all the discrepancies in the Town Survey Records, the Fair block maps, and the tracings from the records of measurement should be sent to the Press. The Fair block maps which will be on three different scales, viz., (1) 1" =33' (1 m.m. : 500 m.m) (2) 1"=66' (1 m.m. =1000 m.m.) and (3) 1 =

132' (1 m.m.:2000 m.m.), are printed as in the case of Revenue map by Helio process, reduced to half the scales. The records of Measurement tracings should be printed on the same scales by Ammonia Printing process. The number of copies of Record of Measurement Tracings and Fair Block maps required for distribution as per the Appendix No. XXXII along with two additional copies of Revenue Block Maps to be kept for reference in the section, should be printed.

59. The original records should then be sent to the record section for preservation after making necessary entries in the concerned catalogues. The printed copies should be sent by the press to the Record Keeper for distribution to various officers, as per prescribed scales of supply and for stock in the Central Survey Office.

WARD MAPS.

60. Reduction prints from the Fair Block maps of all the blocks comprised in a ward should be obtained by Photo Helio on the scale 1″=132 feet (1 m.m. = 2000 m.m.) and they should be cut and pasted within the traverse skeleton of the ward on the scale 1″=132 feet (1 m.m. : 2,000 m.m.) received from the Unit Office.

61. From this rough original ward map, a light blue print on the same scale, on 170 grams paper, should be obtained for the preparation of Fair original ward map. All the important topographical details and names, block boundaries and numbers, names of roads, streets, Railways, side block numbers, reference, etc., should be exhibited in the above Fair Original Ward Map. From this Fair Original 100 copies of Ward Maps required for distribution with two additional copies for reference in the section should be printed in black and white by 2|5 reduction on scale 1 inch=330′ or 16 inches =1 mile (1 m.m.=5,000 m.m.) by Helio Process.

62. The original ward map should then be sent to the Records Section for preservation. The printed copies are to be sent to records section direct by the press for distribution to various officers as per prescribed scale of supply and for stock in the Central Survey Office.

63. In lieu of Ward Maps, Division Maps are prepared in the case of Madras City. The Division Maps supplied will be on the scale of 1″=4 chains or 20"= 1 mile (1 m.m.: 4,000 m.m.). The rough original will be prepared on the scale 1"= 2chains (1m.m. : 2,000 m.m.) from the rough Block maps, after suitable reduction to the required scale. The procedure outlined for the Ward Maps will apply to the Division Maps of the Madras City.

TOWN MAPS.

64. Reduction prints of all the wards comprised in a Town should be obtained in black and white on the scale 1" =5chains or 1"=330 feet (1 m.m. : 5,00 m.m.) and compiled within the plotted skeleton of the town on scale 1"=330 feet (1 m.m.=5,000 m.m.) received from the unit office.

65. From the rough original Town map a light blue print on 170 grams paper on the same scale i.e. 1"=330 feet (1 m.m. : 5,000 m.m.) should be obtained for preparation of the fair original Town Map. The names of all the important topographical details such as roads, streets, railways, side-villages, reference etc., should be exhibited in the fair original map. The number of the ward and its boundary should also be shown in the map. Where the town does not contain Wards, but only blocks, the boundaries and numbers of the blocks should be indicated in the map. Environs in about a distance of one mile (1½ k.m.) adjacent to the Municipal boundary should be marked in the map. For this purpose the latest village maps of the surrounding villages should be consulted. Only important topographical details and the names including village sites need be shown. The Revenue Survey Fields should not be shown.

66. On completion of the preparation of the original Town Map, a black and white proof copy on 122 grams paper, on ½ reduction scale i.e., 1"=660' (1 m.m.=10,000 m.m.) and three grey prints on 50 grams paper should be obtained.

67. The black and white proof copy should be verified and discrepancies, if any, should be noted therein, for rectification in the plate in the Press. The three grey prints should be utilised for the preparation of the three colour guides viz., (*a*) light blue for lakes, tanks and other water ways (*b*) Geranium for important public buildings and (*c*) brown for roads, to facilitate the printing of final copies of the town map in colours. Central Government lands situated within the Municipal limits, if any, should be shown in a separate colour, in an additional print secured for the purpose.

68. The number of copies required (300 as, per the existing orders) for distribution (*vide* Appendix No. XXXII) plus 2 copies in addition intended for reference in the Section should be printed by ½ reduction to scale 1"=660 feet (1 m.m.=10,000 m.m.) in colours. The original map should then be sent to the record keeper for preservation after making necessary entries in the catalogue concerned. All the printed copies of the Town map are to be sent to Record Section by the Press from where they will be distributed to the various officers as per the prescribed scale of supply.

69. The Madras City Maps are printed in three different scale viz.,10″ =1 mile, 5″=1 mile and 3·3″=1 mile = (1 m.m. 5,000) 1 m.m. : 10,000 m.m. and 1 m.m. : 20,000 m.m.). The rough original is compiled on the scale 20" =1 mile (1 m.m. 4,000 m.m.) after obtaining reduction prints in black and white from the Division maps and further processes of work to be done are the same as for the Town Map Rough Original. A light blue print of the rough original should be obtained on the same scale to be utilised as the Fair Original and the further processes as in the case of Town Map should be completed. Final prints should be obtained by suitable reduction to get the final copies on the 3 diffierent scales mentioned above.

INDEX MAP.

70. For all the Towns Surveyed under the Town Survey System an original index to Block Maps should be prepared. A light blue print of the Town Map obtained on 130 lbs. (170 grams) paper on scale 8″=1 mile should be utilised for the purpose. The boundaries of all the Wards and Blocks comprising the Town and the important topographical details should be exhibited in the original map.

71. 50 copies of the Index to Block maps should be printed by half reduction to the scale 4″=1 mile for each ward and should be attached with each set of the Revenue Block Maps pertaining to the respective wards :—

STREET SURVEY RECORDS.

72. On receipt of the Street Survey records of a Panchayat from the Survey Unit Office, the records should be finalled and the discrepancies noticed by the draftsman recorded in the error list. The errors recorded should be scrutinised by the Section Head, Head Draftsman, Technical Manager and the Deputy Director. All cases requiring verification in field should be sent to the Survey Unit Officer with relevant sketches furnishing the particulars required to be verified in field. All the discrepancies that can be rectified in Central Survey Office should be attended to in the records as per the orders in the error list.

73. After rectification of all the discrepancies in the records, the number of copies required for distribution (*vide* Appendix No. XXXII). plus 2 copies for reference in the section should be printed by Ammonia Process from the original composite map on same scale (i.e.) 16″=1 mile (1 m.m.=5,000 m.m.) in black and white by Vandyke or Helio process.

74. Tracings should be prepared from the original street survey field Measurement book on same scale, in Bank Post Paper or in some other paper similar to Bank Post paper, in Indian Ink. Only the names of important public places, viz., Schools, play grounds, public offices, temples, etc., should be shown. Enlargements showing the tie-line measurement and angles should be drawn separately on the sides of the tracings in all cases where such measurements could not be legibly entered near the symbols of theodolite stations, within the field sketches. The headings should be typed and the names of street, written neatly on the top of the tracings.

75. The number of copies required for distribution (*vide* Appendix No. XXXII) should be printed from the street field tracings.

76. The printed copies of the composite map and street field atlas should be sent to the Record Section by the Press for distribution to the Officers concerned. The original street field tracings should be attached in volumes and sent to the Record Section along with the original composite map for preservation after making entries in the catalogue concerned.

PREPARATION OF COMPOSITE MAP FOR LOCALITIES ALREADY SURVEYED UNDER THE STREET SURVEY SYSTEM.

77. The preparation of composite maps in respect of the Panchayats surveyed prior to the issue of orders introducing the preparation of composite maps in lieu of the Union and insert maps is done in the Central Survey Office whenever requisition is received from the Panchayat Board concerned. The following procedure is followed for the preparation of such composite maps.

78. A copy of the notification regarding scheduled boundary of the Panchayat describing the area comprised within the limits of Panchayat Board as recorded in the constitution Register should be obtained from the office of the Regional Inspector of Local Boards and Municipal Councils.

79. Where portions of villages are included within the scheduled boundary of the Panchayat, such portions should be marked in the copies of the village map of the concerned villages. Where the particulars of Survey fields included within the Panchayat Board are not clear in the notification, litho maps of the village comprising the Panchayat with the scheduled boundary of the Panchayat marked in them should be obtained from the Executive Officer or the President Panchayat Board.

80. The Survey fields comprised within the Panchayat should then be traced in separate sheet from the litho maps. The tracings thus prepared from all the litho maps should be sheet-joined and this will indicate the area for which the composite map is to be prepared. The tracing should then be traced in 112 grams paper and this will serve as the Fair original of the composite map.

81. Reduction print of the union map on scale 40″=1 mile already prepared during the street survey of the panchayat should be obtained on scale 1″=5 chains (1m.m =5,000 m.m.) and inserted in the relevant place in the Fair original of the composite map. The inserted fields in the original should be neatly inked in Indian Ink. All the topographical details available in the litho maps of the villages should be exhibited in the original composite map. The revenue survey numbers should then be typed in vertical type in the original map with reference to the litho maps and street survey numbers typed in slanting types with reference to the Union Map.

82. The numbers and names of side villages, heading, leading names, reference, etc., should then be typed in their appropriate places in the original map. The village boundaries of the included villages and their numbers and names should also be exhibited in the original map.

83. On completion of the preparation of the original, 2 proof copies of the composite map on the same scale of 1″=5 chains (1 m.m. : 5,000 m.m.) should be obtained, one for verification in the Technical Section and the other to be sent to the Executive Officer or the President, Panchayat Board for verification and approval. On receipt of the proof copy from the Panchayat Board duly verified, additions or alterations, if any, proposed by the Panchayat Board and also the corrections marked in the proof copy verified by the technical section should be carried out in the negative plates in the Press.

84. Final copies for distribution should then be printed in black and white on the same scale of 1”=5 chains (1m. m.= 5,000 m.m.) by Vandyke or Helio Process. The Printed copies of composite map should be sent to the Record section by Press for distribution to the various officers as per prescribed scale of supply. The original composite map should be sent to the Record Section for preservation, after making necessary entries in the catalogue concerned.

ROAD MAP.

85. This map is mainly intended for the use of the travelling public and motorists. The important particulars shown in the map are roads, their classification with distances, location of petrol bunks, travellers bungalows, etc.

86. The original of the map is prepared in the scale of 1″=12 miles (1 m.m. : 7,50,000 m.m.) for publication on scale 1″= 20 miles (1 m.m =12.50,000) after 3|5 reduction (⅗ reduction.)

87. If the original of the map is not fit for photo reduction a light blue print of the same is obtained from the Press and the original prepared. If the original of the wall map or the Road map is not fit for the light blue print or if there are too many changes, a fresh original should be compiled. The procedure adopted for the compilation of the original of the wall map should be followed in this case, too.

88. The particulars regarding the location of the petrol bunks should be ascertained from the leading petrol distribution companies and should be incorporated in the map with appropriate symbols shown in the reference sheet. The particulars regarding the location of Civil Aero dromes and Landing Grounds should be ascertained from the Director of Civil Aviation and incorporated in the original.

89. The main features shown in addition are the distances from junction to junction of the roads and the distances from Madras to the important towns or villages in red. The Press and publication imprint, etc., should be typed at the bottom of the map outside the border line as in the case of district touring and taluk maps.

90. The continuation of important roads and railway lines and rivers in the adjoining states should also be shown. This can be shown with reference to the Survey of India Sheets. The roads in the adjoining States should be shown with separate symbols as shown in the reference sheet.

91. After completion of the original it should be examined by another draftsman, finalled by the Senior Draftsman and submitted to the Head Draftsman, Technical Manager and the Deputy Director for final scrutiny and orders. The original should then be sent to the Press for the supply of proof copies.

92. The proof copies, on receipt from the Press should be hand-coloured and sent as proofs for verification. One copy should be sent to the Chief Engineer (Highways), another to the Chief Engineer (Railways) and also to the Chief Engineers of the adjoining States for verification. When the proof copies are received in Office after verification, the corrections marked therein should be carried out in the originals after obtaining the orders of the Deputy Director.

93. The original with all the corrections duly carried out should then be finally examined by a senior draftsman, the Head Draftsman and the Technical Manager and submitted to the Deputy Director

for final approval. Thereafter, the original should be sent to the Press for supply of grey prints for the preparation of colour guides. The procedure for the preparation of colour guide is the same as that for district maps.

94. After completion of the preparation of colour guides they should be examined by another draftsman and Senior Draftsman and sent to the press along with original for the supply of combined colour proof. The combined colour proof should be examined with reference to the original colour guides and additions or deletions, if any, should be marked neatly in red ink and returned to the press for printing of final copies. The total number of copies required should be printed and supplied to the Record Keeper for sale to the public and distribution to the Government Department.

EXTRA DEPARTMENTAL WORKS.

95. In addition to the departmental maps extra departmental work such as development maps, crime chart maps, statistical atlas state map showing community development and national extension programmes, and charts for the police administration report, factory administration report, maps and charts required by the Chief Engineer, Director of Information and Publicity Department etc., are also prepared and printed. These maps are prepared according to the information furnished by the indenting departments. The colour scheme, the size and tne scale of the map, etc., are adopted according to the requirements of the indenting departments.

96. If the specimen maps and charts sent by the indentor are fit for reproduction they are straightaway taken up for printing the copies. If the originals are not fit for reproduction, they are re-drawn, and copies printed according to the particulars furnished.

97. In all cases, proof copies should be sent for verification and approval of the department concerned and final copies should be printed thereafter, after incorporation of corrections, if any.

98. The actual cost of preparation and printing is recovered from the indentor by means of adjustment bills. For all such extra departmental works, the concerned office files in original, should be submitted to the Joint Director of Survey and Land Records, in circulation after all action is over, for post approval of the action taken by the Deputy Director.

UNIVERSITY DEGREE AND DIPLOMA FORMS.

99. The degree and diploma forms required by the University of Madras are also prepared and printed. The originals are prepared after obtaining light blue prints of the specimen furnished by the indentor.

100. As this requires some artistic work, only specially trained draftsman are employed on this and the script types are used for the preparation of originals. The originals are prepared by using paste-up slips of script types on bank post paper by pasting them on suitable blank drawing sheets. After completion of the original, they are sent to the Press for necessary photo-reduction and printing.

101. Proofs are to be first sent to the Registrar, University of Madras, for verification and approval and thereafter final copies are to be printed and supplied or the paper supplied by the University. The cancelled copies should be destrayed after printing the final the final copies.

102. The cost of preparation of the original and printing should be recovered from the indenting office by sending cash bills.

STATE OUTLINE MAPS.

103. State outline maps are published on different scales. These maps are mainly intended for the use of the Government Departments to post the various details pertaining to them.

104. Outline maps on the scale of 1"=32 miles (1 m.m.: 20,00,000 m.m.) are prepared in two varieties, one showing the boundaries and names of districts and the taluks comprised in each and the other, showing only the boundaries and names of the district.

105. One light blue print on the scale of 1″=32 miles (1 m.m.: 20,00,000 m.m.) is obtained from the press from the original wall map after necessary photo—reduction. The procedure for the preparation of the original is the same as that of the state map. The originals are prepared on the same scale and printed in black and white.

106. State outline map on scale 1 =48 miles (1 m.m.: 30,00,000) are prepared (*a*) with district boundaries, taluk boundaries and their names and (b) with only District boundaries and their names. These maps are also printed only in black and white. The procedure for the preparation of the maps is the same as that of the outline maps on scale 1″=32 miles (1 m.m.: 20,00,000 m.m.).

107. State outline map on scale 1″= 8 miles, 1″=12 miles and 1″=16mil 1m.m.=5,00,000m.m.) 1m m. : 7,50,000 m.m.) and 1 m.m. =10,00,000 m.m.). The originals for these maps are also prepared on same scale on the light blue prints obtained from the Press from the original wall map. The details shown in these maps are. (1) District and Taluk boundaries with their names (2) Headquarters of the district, division, taluk and sub-taluk and imporant details such as roads, railway lines and main rivers. The maps are also printed in black and white. The procedure for the preparation of the map is the same as that of the outline maps.

DISTRICT OUTLINE MAPS.

108. This map is mainly intended for use in Government Department to insert details of their activities.

109. The original is prepared on the scales of 1"=4 miles or 1"=2 miles (1 m.m. : 2,50,000 m.m. or 1 m.m. : 1,25,000 m.m.) by obtaining a light blue print from the original of district touring map concerned.

110. The names of villages are to be typed in two different types, one representing villages with a population of 5,000 and above and the other representing a population below 5,000, such as firka Head-quarters. The map should not be over-croweded with details, as this would defeat the object for which the maps are printed. Only limited important details are to be shown. The firka boundaries are marked in the taluk map with reference to the information furnished by the Revenue Department and the taluk maps with firka boundaries are to be pantagfaphed to the scale of the original district map, after suitable reduction and then inserted in the original and inked up. The names of the firkas are not to be typed in the body of the map. The firakas should be numbered serially taluk war and the names as well as the numbers typed in the margin in the form of a statement. The procedure for the preparation of the map is the same as that for a district touring map except that no colour guides are necessary as the map is printed only in black and white.

111. Before printing final copies, one proof is obtained from the Press and the corrections if any are marked in it in red ink and returned to the Press, for printing final copies.

112. One hundred copies of the map are to be printed and kept in the record for sale to public and supply to Government Departments.

REVISION AND REPRINTING OF MAPS (VILLAGE MAPS)

113. A programme of reprinting of village maps is drawn up by the Deputy Director in consultation with the Collectors and with reference to the balance stock of copies available, priority being given to those village maps which were printed 30 or more years ago and the villages for which copies are in demand. The reprinting of village maps is taken up taluk by taluk and is confined to ryotwari villages only. Sanction of the Board of Revenue should be obtained for reprinting village maps and the Deputy Director of Central Survey Office, should draw up a programme and submit the same to the Board for approval.

114. The Collector of District should be requested to send the maintained copies of the village maps with all the maintenance changes and topo changes such as streams, channels, culverts, roads bridges, anicuts, calingula, shrines, the nature of the road, footpath and cart-track duly carried out up-to-date. On receipt of the maintained copies of the village maps, the original field measurement books should be obtained from the Records Section.

115. The original village maps prepared during the latest survey should be examined by the Works Manager and the Deputy Director to see whether the maps will stand to reproduction. If the existing original village maps are reported fit for reproduction by Helio process, they should be mended and pasted up, where necessary and all the changes marked in the maintained copies of the village maps should then be carried out in the original in the following manner.

116. The changes in the maintenance maps should be traced on Bank post paper. The tracings should then be superimposed over the original maps in their correct relative positions and the changes should be traced on the original maps adopting the same procedure as that adopted for tracing the pentagraphed village map sketches in the projection sheet for the taluk. The leading names, distances, and the names and numbers of side villages, etc., should be corrected according to the entries in the side villages. Wherever the names have been altered, the correct names are to be printed on slips of Bank post paper with the hand-typing machine and pasted at the appropriate places. The names and spellings of the villages in the latest alphabatical list of villages should be adopted. The village map should be checked up with the taluk map in regard to details and each and every field should be verified with the original field measurement book. Discrepancies noticed, if any, should be noted in the final Examination Report for village maps in Survey Form No. 118 and they should be rectified after obtaining orders on the examination report. The pale figures should be touched up and the pale lines and details re-inked.

117. Where the existing original map is reported unfit for either Vandyke or Helio reproduction fresh orginals are to be drawn in, the following manner. The maintained copies of the village map should be placed over the tracing glass. A drawing paper should be placed over the map and the map traced on it in pencil. Every field in the tracing which will be used as original for reprinting of village maps should then be verified with the field Measurement Book, to see that all the bends have been traced properly. The tracing should then be inked with Indian Ink. The names and numbers should be typed on the tracing. The details should be inked with reference to the field measurement book. The headings, scale of the map, keys, etc., should then be typed and drawn and the map completed.

118. The redrawn original should then be compared with the Field Measurement Book, the maintained copy of the village map and the Taluk map by a drafts man who will write up the final examination report in Survey Form No.118. The maps should hen be examined by the Sub-section Head Draftsman and the Technical Manager and the Maps, put up to the Deputy Director, together with the Final examination report for orders.

119. The maps should be sent to the Press for supplying proof copies by the Ammonia Process. On receipt of the proof map from the Press, the discrepancies noticed during the comparison and finalling of the map should be noted in the proof copies. The proof map with an extract from the Taluk Map in respect of the village should be sent to the Collector in batches of villages for verification of discrepancies.

120. On receipt of the proof map, the Collector should send them to the Tahsildar concerned for getting the defects rectified by the maintenance field Surveyor. The proofs resubmitted to the Collector by the Tahsildar should be scrutinised by the District Inspector of Survey and Land Records who should attest the corrections after verification. The attested proofs should be sent to the Central Survey Office with a report for further action.

121. The proof maps received from the Collector should be scrutinised again and the corrections made in the original map by a Draftsman. The corrections carried out in the original map should be verified with the proof map by the sub-secion head and examined by he Head Drafsman.

122. The traverse area printed in the map and the area by field furnished in the proof by the Collector should be got verified by the Head Computor who would also reconcile differences between the two areas, if any, and furnish the correct area to be adopted for approval by the Deputy Director. The area by fields should then be typed on the map, after it is entered in the area register maintained by the Head Computor.

123. The original maps should finally be examined by the Head Draftsman and the Manager (Technical) and sent to the Press, under the orders of the Deputy Director, for printing the number of copies required according to the scale for distribution furnished in Appendix No. XXXII.

REVISION AND REPRINTING OF TALUK MAPS.

124. Taluk maps are reprinted when the stock of maps of the latest issue is exhausted. As the topographical features and other changes are likely to be so numerous as to render the map quite out of date, the taluk maps are generally revised and reprinted at intervals of 15 years. Generally, the revision of 15 taluk maps is taken up every year according to a programme drawn up with reference to the last revision, priority being given for the taluks for which copies are completely out of stock and copies of which are largely in demand.

125. The original map initially compiled or the past revised original maps are sent to the Press for supply of light blue print by reproduction. The original maps are to be checked with the Graticule values and if the values are found to agree, the orginal maps are sent to the Press for supply of light blue prints. The light blue prints should be utilised for drawing the fair original. The light blue print should be compared with the latest maintained copies of the maps of the villages comprised in the Taluk. The changes if any, should be carried out on slips of Bank Post paper and then carried out in the original pentagraph sketch and traced in the light blue print. Further processes detailed for the compilation of Taluk map should be followed.

126. In cases where the original map of the last revision or reprint is found unfit for reproduction or the changes in the topography are too numerous, a fresh original should be prepared as is done during the original compilation.

127. At the time of revision, changes in the numbering of the villages necessitated either by the transfer of villages originally comprised in the Taluk, or by addition of villages from other taluks and elimination of bi-numbering of villages should be done. The latest numbers assigned to the villages and approved by the Collectors either in the proof copy or in the eye-sketch map should be carried out in the original records in the section, Record section and in the Central Survey Office and extracts should be sent to the Collectors concerned, with a request to carry out the corrections in the registers, records and maps available in the District.

DISTRICT TOURING MAPS.

128. District Touring maps are primarily intended for the use of Touring officers and their purpose will not be served, if they do not contain upto date information regarding the roads and other details. The maps are, therefore, revised and reprinted once in 5 years.

129. A programme for the revision and reprinting is to be drawn up by the Deputy Director of Survey for the approval of the Board, with reference to the year of last print, priority being given to the Districts, the maps of which are not available in stock and the copies of which are largely in demand.

130. The instructions for the revision and reprinting of Taluk Maps, except those relating to the numbering of villages and the exceptions detailed under the compilation of the original District Maps apply to the revision of District Touring Maps.

STATE DISTRICT ATLAS AND WALL MAPS.

131. The atlas is revised and reprinted only when the existing edition becomes quite out of date.

TOWN MAPS, WARD MAPS, BLOCK MAPS AND RECORD OF MEASUREMENT.

132. Reprinting of Town Maps, Ward Maps, Revenue Block Maps and Ammonia Prints of Record of measurement of Municipal Towns are generally taken up in Central Survey Office on receipt of requisition from the Municipal Commissioner concerned for the supply of maps, provided saleable copies of the maps are not available in stock at the Central Survey Office. The following procedure should be adopted for the revision and reprinting of the various maps described above.

133. The maintained copies of the maps should be obtained from the Commissioner.—The estimated cost of incorporating the maintenance changes in the existing original or freshly prepared original in case the present original is unfit, the cost of typing and printing copies should be worked out and intimated to the Commissioner who is to obtain and send the resolution of the Municipal Council agreeing to bear 2|3 of the cost, after remitting the annual cost in advance.

TOWN MAPS.

134. The existing originals of town maps are of two kinds (1) Modern style and (2) old style. The originals of Modern style are on scale 16 inches = 1 Mile (1 m.m. : 5,000 m.m.) and will show the environs of the town and also the built-up areas within the town

in detail. The originals of old style will be on scale 20 inches = mile (1 m.m. : 4,000 m.m.) without environs and will not show the building details. The revision and reprinting of the above two kinds of Town Maps should be done, as described below:—

(*a*) *Modern style originals.*—The changes found in the Maintained copy received from the Commissioner should be incorporated in the existing original Town Map, if it is found fit for reproduction or on an original prepared afresh.

(*b*) Two proof copies of the Town map should be printed on the scale 8 inches = 1 mile by half reduction (1 m.m.: 10,000 m.m.,) out of which one proof copy duly hand-coloured should be sent to the Municipal Commisioner concerned for verification and return, duly making therein additions or alterations if any. The other proof copy should be verified, by the Technical Section and necessary corrections, if any, marked therein.

(*c*) On receipt back of the proof copy from the Municipal Commissioner, corrections if any, marked therein and the corrections marked in the proof copy verified by the Technical Section, should be carried out in the negative plates in the printing section. The corrections in the former case should be carried out in the original map also.

(*d*) Final copies of the Town map should then be printed and supplied as per rules 82 to 85 under Town Maps. After the distribution of the copies of Town Map to the concerned officers the total cost involved in the work should be worked out and a cash bill sent to the Municipal Commissioner for payment of the proportionate 2|3rd cost.

Old Style originals.—In the case of originals on old style, fresh originals on modern style should be prepared during the revision and reprinting.

A light blue print on scale 16 inches = 1 Mile (1 m.m: 5000 m.m) should be obtained from the old original by 4|5th reduction and utilised for the preparation of fair original on modern style. Further processes should be done as explained under rules 100 to 102 under Town Maps. The maintenance changes should then be carried out in the originals as per maintained copy received. Instructions under paras 227 to 230 supra should then be followed for printing final copies of the town map.

WARD MAPS.

135. The changes found in the maintenance set should be incorporated in the existing original, if found fit for reproduction or on a freshly prepared fair original on a light blue print on the scale

1 nch = 66 feet (1 m.m. : 1,OOO m.m.) obtained from the original. Two black and white proof copies should be obtained on scale 1 inch=330 feet (1 m.m. : 5,000 m.m.). The proofs should be sent to the Municipal Commissioner for verification and further action taken as in the case of Town Maps. The same procedure for the recovery of cost of revision for the Town maps detailed in rule 132 will also apply to this revision and reprinting of ward maps.

REVENUE BLOCK MAPS AND RECORD OF MEASUREMENT.

136. The originals of the revenue Block Map and the Record of Measurement should be brought up to date, with reference to the Maintained set received from the Commissioner and the number of copies printed as done during the original survey. Proofs are not sent in this case to the Commissioner for verification but they are verified in the Technical section only in respect of the Revenue Maps before they are sent to press for final printing. Instructions contained in rule 132 for the recovery of the cost of revision will apply to this case also.

ROAD MAPS.

137. The road maps are revised and reprinted as and when copies already printed run out of the stock. Up to date changes are incorporated with reference to the latest District Touring Maps and then the proof is also sent to the Highways Department, Railways etc., as in the case of initial compilation and printing of this map, before final copies are printed.

CHAPTER XXIII

PHOTO ZINCO PRESS

I (a) General Rules—Office Procedure—Accounting Procedure.

The main work of the Photo Zinco Press of the department is to reproduce and print maps, plans, charts etc prepared by the department with a view to publication. This is done in the Photo Zinco Press by Photo lithography adopting the Wet collodion technique. At the begining of each financial year a programme of departmental items is drawn up and got approved by the Joint Director of Survey and Land Records. Every effort is made during the course of the year to keep up the programme drawn up. Other items of work are taken up only if it is felt that execution of them will not interfere with programmed Departmental Items. When it is felt that a bulk indent that is received (say like maps from the Director of Census Operations, maps from the Chief Electoral Officer etc) will require suspension or modification of the approved programme of work the matter is reported to the Joint Director of Survey and Land Records and further action is taken only after getting his concurrence to the procedure proposed to be adopted.

The department makes budget provision only for departmental items to be executed. Hence as laid down in the Tamil Nadu Accounts Code the actual outlay entailed on non-departmental items are debited to the appropriate debit Heads of Account of the indenting departments by following the procedure laid down in G.O. No. 297 Finance (Budget General) Department, dated 12th March 1974. In G.O. No. 7096 Revenue department, dated 28th November 1973 Government have ordered that commercial principles should be introduced in the working of the Photo Zinco Press. Hence debit is passed on to the indenting department.

When work is done to a statutory or local body like the Port Trust, Corporation of Madras, etc., the actual outlay entailed is realised in cash by sending a cash bill after all work is over. In the case of private parties the estimated cost is realised in advance and then only is the work put in hand. After all action is over the actual outlay entailed is found out and the excess amount, if any to be recovered, is recovered from the indentor and then only the finished product is handed over to the indentor.

The Photo Zinco Press is a Factory as defined in the Factories Act, 1948 and the Tamil Nadu Factories Rules, 1950 as amended from time to time. Other Acts and Regulations like the payment of wages Act and the rules made thereunder, the Workmen's compensation Act and the rules made thereunder, etc., apply to the Factory. But the employees are governed by all the rules and regulations like Service rules, leave rules, gratuity and pension rules, Family Pension rules, Provident Fund, Civil Services (Classification Control and Appeal) Rules, Government Servant's Conduct Rules, etc., that apply to every other employee of the Government of Tamil Nadu. Government have laid down that the code of discipline in Industry applies to the Photo Zinco Press. The code has been accepted by the Photo Zinco Press Industrial Employees' Union.

As soon as an indent is received it is examined and if it could be executed without detriment to programmed departmental items, it is put on hand straight away. When the indentor wants an estimate of cost it is worked out and intimated to him and the work is put on hand only after he conveys his formal acceptance of the estimate furnished and the conditions mentioned. In the case of a private indentor in addition to his conveying his formal acceptance of the estimate furnished and the conditions mentioned he should remit the estimated amount. Then only the work is put on hand. Where necessary the indentor is informed of the probable dates for supply of proofs and copies and every effort is made to accommodate, as far as possible, to the requirements of the Government indentors. If nothing is heard from the indentor for a period of one month from the date of the copies supplying on invoice the negatives and plates will be cleaned and utilised for other items of work. In the case of indents like graph sheets where repeat orders are expected the negative may be kept unwashed under instructions of the Works Manager so that when repeat orders are received the work could be executed at much less cost and at a quicker time. Any negative kept unwashed may be cleaned under instructions of Works Manager and utilised for their urgent departmental or non-departmental items if so required.

1 (*b*) *Photo Zincography.*—The application of photography to the reduction and reproduction of plans was first made in 1859 by Lieutenant General Sir Henry James, R. E., Director-General of the Ordinance Survey of Great Britian and Ireland.

2. Photo Zincographic Printing comprises of a number of Trades as detailed below:—

(*a*) Negative making.
(*b*) Duplication of Negatives by Powder.

(c) Negative storing and glass cleaning.

(d) Retouching and engraving of negatives.

(e) Printing down to Zinc plate.

(f) Making paper prints.

(g) Proving plates.

(h) Cleaning, graining and stoing metal plates.

(i) Direct drawing on metal plates.

(j) Machine Printing.

A brief description of each process is given below :—

Negative Making.

Wet Collodion technique is generally adopted. The cameras used are of two types (i) the Gallery type and (ii) the dark room Type. The Gallery type is the older one and is so named because the Camera stands out side the dark room. Sensitive Photographic materials must be carried by means of a dark slide to such a camera. The copy by board is usually fixed while the lens carries and the plate back are movable.

The dark room type differs from the gallery type in that the dark room itself acts as the Camera, the lens being fitted to its wall. This arrangement obviates the use of a dark slide and so, the handling of large plates is much facilitated.

Both types of cameras are set on springs or on rails, so that floor vibration may be absorbed and the camera parts are relatively still at any time. In the modern versions of the dark room camera, the Camera is suspended from overhead bars instead of resting on the rails. This has the advantage that the operator is able to work beneath the Camera and his movements are not restricted by any cumbersome frame work.

In all types of Cameras parallelism between the plate, the lens-board and the copy board are essential. The lenses for photo-litho work should be colour corrected and free from distortion. It is also important that flare should be minimised. The lens should also sharply focus at a wide aperture, an image as large as the maximum size plate to be used. The covering power of a lens varies with the magnification, same size reproduction being the usual standard of specification. The old practice of using a lens the focal length of which is numerically equal to or greater than the diagonal of the negative being made does not hold with modern lenses some of which will cover a plate whose diagonal is considerably greater than the focal length of the lens. However, the use

of a lens of focal length greater than the diagonal of the maximum size plate has the advantage of more even illumination.

If

f	the	—Focal length of the lens.
u	,,	—The object distance.
V	,,	—The image distance.
R	,,	—Number of times enlargement.
r	,,	—Number of times reduction.

then

$$R = \frac{f}{u-f} \qquad r = \frac{u-f}{f}$$

and

$$R = \frac{V-f}{f} \qquad r = \frac{f}{V-f}$$

From the above it follows :—

U or V	Enlargements	Reduction.
u	$f \times \frac{(R+1)}{R}$	$f\,(r+i)$
v	$f\,(R+1)$	$\frac{f\,(r+i)}{r}$

The above formulae will be useful to find the distance at which the copy board should be kept in front of the lens (u) or the distance at which the plate should be behind the lens (v) for the enlargement or reduction required (R or r).

3. *Focussing.*—The original is pinned on a copy board which can be tilted about two axes at right angles to each other which lie in a plane approximately at right angles to the axes of the camera lens. By tilting the copying board slightly, small distortions in the shape of the original can be rectified but the amount of distortions that can be rectified is limited. Little further need be said regarding the manual operations of focussing the image of an original to a given size on the ground glass screen. When focussing the Camera visually and using a lens of focal length greater than the plate diagonal almost full aperture may be used. But for critical work focussing must be done using a stop arrangement to prevent rays of light failing on the edges of the lens affecting the sensitised plates. The stop should be only slightly larger than one to be used for the actual exposure. Usually for exposure a stop is used which has a diameter 1|64th of the Camera extension.

4. *Cleaning Glass Plates.*—The glasses used are patent plate glasses. Glass plates upto a maximum size of 106 c.m. × 71 c.m. × 6 mm. are used. These glass plates which support the film must be entirely free from contamination of any kind. Any dirt remaining on the glass surface will reduce the silver salts in the collodion to metallic silver and thereby cause scum-like marks or even opaque spots on the negative. The glass is cleaned usually by coating it with concentrated Nitric acid, allowing the acid to remain on the surface of the glass for at least 12 hours and then washing it out with water. A soft cuttle fish properly prepared may be used to aid washing. In extreme cases where surface of the glass is greasy a saturated solution of potassium bichromate in concentrated sulphuric acid may be used. While using this solution, the operator should be all the more careful and protect his hands with rubber gloves.

5. *Albuminising glass plates.*—The collodion with which the plates is to be coated will not by itself adhere firmly to the glass during the several manipulations. To over come this difficulty, the glass plate is surfaced with a substratum. The substratums generally used is a solution of Albumen in water made up as follows :—

Albumen Egg. (dried) — 2 grms.

Water — 100 c.c.

Liquor Ammonia — 1|2 c.c

After making sure that the glass surface is clear, the well-filtered albumen solution is flowed over preferably, twice to ensure an even and completely coated surface. Care should be taken that the solution does not creep to the underside of the glass as it would eventually be dissolved and deposited in the silver bath. The coated glass plate must be dried in dust free racks. This substratum ensures freedom from distortion of the collodion film.

6. *Preparation of Collodion and Iodising, Iodising of Collodion and coating glass plates with Iodised Collodion.*—Collodion is the basis of the Wet Collodion process as it forms the vehicle in which the Photographic image is deposited. Collodion is a solution of pyroxylin in alcohol and ethylether. Pyroxylin is obtained by the nitration of cotton linters. Here, Cellulose tri and tetra nitrates are formed. If nitration proceeds further, we get cellulose hexa nitrate which is gun cotton — a substance insoluble in a mixture of alcohol and ether. A good formula for collodion is :—

Pyroxylin — 15 grms.

Alcohol — 200 c.c.

Ether — 600 c.c.

To prepare the solution the alcohol is taken in a bottle and the pyroxylin added in small quantities at a time to enable its being thoroughly wetted by the alcohol. It is allowed to soak in the alcohol for an hour or two. The ethyl ether is then added, and the whole shaken well. If it is good pyroxylin, it will dissolve forming a practically colourless solution. The light sensitive salts used widely in the Photographic field, are mainly the chlorides, iodides and bromides of silver. In order to precipitate one or more of these salts in the collodion by immersion in silver Nitrate solution, it is necessary to add the elements of chlorine, bromine Iodine or a mixture of them in soluble form in the collodion. The salts generally used for this purpose are the Iodides and Bromides of ammonium and cadmium. These salts are soluable in ether-alcohol mixture. The salts are usually added by preparing a solution of them in alcohol and adding that solution called Iodiser to the collodion.

A good formula for Iodiser is:—

Ammonium Iodide — 180 gms.

Cadmium Iodide — 360 gms.

Cadmium Bromide — 120 gms.

Iodine Resublimed — 12 gms.

Alcohol (Rectified Spirit) — 9 litres.

For use, add 500 c.c. of the Iodiser to 2 litres of Collodion.

The solution of Bromides and Iodides in alcohol become darker in colour with standing. This is noticeable when the plain collodion is iodisal. It changes colour from light red to a deep red, due to the formation of free Iodine and bromine in the collodion. The collodion should not be used till it has assumed this deep red colour taking about a week to do so. Some times, it may be advantageous to add a few drops of Iodine solution made up as follows :—

Iodine — 1 grm.

Iodiser — 80 c.c.

About 1 c.c. of this iodine solution called the accelarator may be added to every 300 c.c. of iodised Collodion. A good collodion should flow easily, must set slowly and must not dry in the Camera and must therefore be porous enough to carry a large amount of Sensitising solution.

The glass plate is coated by pouring a pool of collodion on to the centre and making it flow all over by tilting carefully. The film thus formed must be uniform in thickness and free from waviness. The most suitable temparature is 18 °C to 24 °C

For coating large sized glass plates it is advantageous to rest the glass plates on a leather pad placed on a firm stool.

7. *Silver bath — its preparation.*—The Silver nitrate solution known as the silver bath is an 8 — 10 per cent solution of Crystalline silver nitrate in water. The solution is made acid (P.H.—5) by the addition of sufficient nitric acid to just change the colour of blue litmus red. A silver bath works best when it contains a trace of dissolved silver iodide. This is accomplished by the additioin of 10 c.c. of a 1 per cent Potassium Iodide solution to every litre of silver nitrate solution. A good formula for the silver Nitrate bath is as follows :—

Silver Nitrate — 700 gms.

Pottassium Iodide 1 per cent Solution — 70 c.c.

Distilled water — 7 litres.

Nitric Acid — A few drops to give an acid reaction.

The quality of the silver bath controls, to a large extent, the quality of the negative and so the bath must be kept up to strength and well-filtered at all times.

For glass plates of size 106 c m. × 71 c m. × 6 m m. about 7 litres of solution are required. To the bath add daily 1|2 a litre of a 10 per cent solution of silver nitrate before commencing work.

8. *Care of the Silver Bath.*—The reaction taking place between silver nitrate and Iodised Collodion may be represented as follows :—

Ammonium Iodide + Silver Nitrate = Silver Iodide
Ammonium Nitrate.

It can thus be seen that as the Silver bath is used, it accumulates more and more impurities, e.g., Ammonium Nitrate, Cadmium Nitrate, etc., dissolved silver Iodide and alcohol. At a certain stage the silver bath will be saturated with Silver Iodide

and this will be precipitated on the wet plate surface in fine particles, causing pin holes. When the silver bath contains too much iodide and becomes weak, it should be rectified as follows :—

Neutralise the silver bath to litmus, i.e., till the solution has no action on Red or Blue litmus by adding sodium bicarbonate. This neutralisation is necesrary, because silver iodide is less soluble in neutral solution than in an acid solution. Then, dilute it with approximately 50 percent of its volume of water. Then place it in the hot sun for a few days. This 'sunning' reduces the precipitated silver salts to silver and so, the solution will change in colour from light yellow to dark brown or black. Continue the 'sunning' till the volume is reduced to the requisite amount and filter. Add sufficient silver nitrate to bring the solution to the required strength and acidify if necessary with a few drops of nitric acid.

When there is heavy and continuous work, it is preferable to have four baths for each camera. When two baths are in use two baths can be rectified. Two baths are required for use as it is an advantage to use each bath only on alternate days.

9. *Sensitising the Plate.*—After allowing sufficient time for the collodion to set, the glass is placed in the sensitising bath. All light except the safe amber coloured one are cut off and the bath rocked briskly to enable the silver nitrate solution to flow evenly over the plate. It is important that the silver nitrate solution flows across the collodion surface in an even sweep. Otherwise, the negative will be marked.

The time of immersion varies with :—

(*a*) Strength of Silver bath.

(*b*) Temperature.

(c) Constitution of the Iodiser.

The best guide to complete sensitisation is the non-appearance of the greasiness when the plate is examined. After removal of the plate from Silver bath, excess silver nitrate is allowed to drain back to the bath, the back of the plate wiped and the plate loaded into the dark slide for use.

10. *Exposure.*—Expose in the usual way. As the plate is sensitive only so long as it is wet and as the emlusion is a slow one, it is necessary to illuminate the original by arc lamps.

The length of the exposure depends on.

(*a*) Intensity of illumination.

(*b*) Nature of copy.

(*c*) Size of lens aperture.

(*d*) Thickness of film; and

(*e*) Constitution of the film.

11. *Development.*—After exposure, the dark slide is taken to the dark room for development. The developer used is a solution of ferrous sulphate in water and a good formula for that is :—

Ferrous Sulphate — 100 gms.
Acid Acetic Glacial—100 c.c.
Rectified Spirit — 100 c.c.
Water to make — 2 litres.

This developing solution is applied to the exposed plate by flowing it in an even sweep from the plate edge. The development is known as physical development as the ferrous sulphate reduces only the free silver nitrate present on the plate and the reduced silver is deposited on the exposed parts of the collodion film. The negative image is, therefore, on the film surface.

It follows from the above that if an excess amount of developer is used, it will merely wash away the silver nitrate from the plates surface and cause lack of density. So, only the requisite amount for the size of the plate used should be measured out and used. This amount can easily be gauged by experience. About 500 c.c. of the solution should be sufficient for a plate of size 106 c.m. by 71 c.m.

Developing temperature is important. Under conditions of extreme heat, general fogging may result, causing the image to lack contrast. 18 degrees C to 22 degrees C is generally accepted as the ideal temperature range for the development of wet collodion plates.

Acetic acid is added to restrain the developer action and prevent the simultaneous reduction of silver salts over the entire plate. Acetic acid is particularly necessary when working in hot conditions.

Rectified spirit has the effect of reducing the surface tension between the wet plate surface and the developer and so, helps to eliminate the developer marks. The addition of rectified spirit to the developer is particularly necessary when using an old silver bath.

A rapid flashing of the image indicates over exposure, while its slow development is a sign of under exposure. Generally, development should not exceed 30 seconds.

12. *Re-development of Negatives.*—Wet collodion negatives have to be re-developed if they are to have the desired contrast. For this purpose, usually a mixture of Hydroquinone and silver nitrate solutions are used. Good formulae for them are.—

A. Citric Acid—10 gms.

Hydroquinone—20 gms.

Water to make—600 C.C.

B. Silver Nitrate—6O gms.

Water to make—1 litre.

To a few C.C. of the hydroquinone solution, a few drops of silver nitrate solution are added just before use. After the plate has been well washed, it is drained and the re-developing solution poured over it and allowed to remain till the requisite density is obtained. The plate is then well washed with water. Practise alone will give the operator a knowledge of the amount of density required in a negative.

13. *Fixing the Negative.*—Fixing is the process of the removal of the unexposed and undeveloped silver halides. The fixing solution is a 35 per cent solution of Sodium Thiosulphate in water. A good formula for that is :—

Sodium Thiosulphate—350 gms.

Water — 1 litre.

This operation is completed when all the unexposed and undeveloped silver halides are removed, leaving the work portions as clear glass. Experience will enable this point to be gauged easily.

14. *Intensification and Blackening the Negative.*—The negative is well washed and immersed in a solution of:—

Mercuric chloride lumps—500 gms.

Water—8 litres.

The silver is converted into a complex mixture of silver and mercurous salts. As these salts are white in colour, the film gets bleached after a few minutes. It is then washed and blackened with a 5 per cent solution of sodium sulphide

The negative may also be intensified by copper bromide and silver nitrate solutions. Bleaching is done with copper-bromide and blackening with silver nitrate solution.

The solutions are:—

Copper sulphate Solution:—

A. Copper sulphate—100 grams.

Water to make—1|2 a litre.

Potassium Bromide solution:—

B. Potassium Bromide—50 gms.

Water to make—1|2 a litre.

For use, mix equal parts of (A) and (B).

C. Silver Nitrate Solution:—

Silver Nitrate—160 gms.

Citric Acid—20 gms.

Nitric acid—10 c.c.

Water to make—1600 c.c.

D. Iodine Solution:—

Potassium Iodine—100 gms.

Iodine—50 gms.

Water to make—2 litres.

E. Potassium Cyanide solution:—

A very weak solution preferably a 1-2 per cent solution.

The Copper bromide solution is flowed over the plate surface until the film is bleached. The bleaching action is due to the formation of cuprous bromide and silver bromide. Further density, if desired, can be given by bleaching the negative with the iodine solution. The plate is well washed and veil, if any, is removed by evenly flowing over a very weak solution, of Potassium cyanide. The plate is then washed well and blackened with a 5 per cent sodium sulphide solution.

15. *Varnishing the Negative.*—The collodion film is fragile and must be protected before it is handed over for retouching. It is, therefore, coated with the following varnish :—

Gum Dammer or Powder Rosin—100 gms.

Benzene—2,000 c.c.

Castor Oil — 10 c.c.

16. Some of the Common troubles experienced in Wet Collodion making and the possible reasons for the same are :—

Troubles.	*Reasons.*
1. Film becomes loose while in the bath.	Incomplete or thin coating of albumen, dirty glass or too acid a bath.
2. Brown Stains.	Insufficient washing after development, insufficient fixing and insufficient washing after bleaching.
3. Pin holes	Over iodised bath.
4. Black spots and marks.	Insufficiently filtered substratum. Chemical dust falling on the plate before or during coating with collodion. Dust or dried collodion in the pouring bottle.
5. Film Cracking	Albumen coating too thin collodion too thick prolonged drying before immersion.
6. Sharp marks across the negatives.	Uneven flow of developer solution uneven flow of silver bath, plate developer contains insufficient alcohol, plate has been insufficiently sensitised.
7. Weak negatives	Insufficient exposure, Collodion not ripened, too strong and far too acid silver bath, flooding plate with developer, collodion setting too hard before sensitisation.
8. Cracks in the Negatives	Excess ether in collodion, use of weak silver bath or collodion containing excess iodine.
9. Film of scum formed during development.	This trouble shows itself as a scum on the film surface which becomes clean when swabbed gently with cotton. Dark room over heated, Developer too warm. Silver bath too fresh, Collodion not ripended properly, smoke or fumes from burning arcs, insufficient acid in bath.
10. Generally poor definition when lens and Camera are known to be satisfactory.	Focussing with the lens aperture fully open and then stopping down to a very small aperture especially when reducing from a large copy.

17. Ideal conditions for wet collodion Technique.—Unless all conditions are ideal, this in practice cannot be achieved always, troubles are likely to develop and it may be rather difficult, to pin point the source of trouble. This is due to the fact that the emulsion and solutions are prepared at the same time and by the same person who operates the Camera.

Careful temperature and humidity control as well as control of the silver Nitrate bath will result in obviating troubles. The ideal temperature for collodion, Silver bath, developer, etc., is about 21°C. A refrigerator is therefore a useful addition to the wet collodion dark room. The ideal room temperature is about 18° C. and the relative humidity about 60 per cent. The exposure time should be so prolonged as to restrict the developing time to 20-30 seconds.

18. *Powder Process.*—This process is used to duplicate Photographic plates prepared in the Studio. It depends on the fact that when a tacky body of an organic nature is brought in contact with chromic salts and is exposed to light in the form of a dry thin film, it will be found that owing to the oxidation of the organic body by the Chromic salts its tackiness has disappeared and that the disappearance of the tackiness is in exact proportion to the intensity of light acting on it.

A glass plate is coated with such a solution and when dry is exposed to light in contact with the negative to be duplicated. Where the light penetrates the negative the tacky substance on the coated plate is hardened, while the rest of the surface of the coated plate where the light has not penetrated through the body of the negative remains tacky. If now the plate is coated with a very fine powder, the powder sticks only to the tacky (unexposed) portions. Thus the negative is duplicated.

The powder process is used :—

(1) To duplicate and obtain colour component negatives as duplication by this process not only yields identical negatives but also is cheaper when compared to duplication by direct wet plate photography.

(2) To combine together a number of small negatives and obtain a single negative for printing down to metal.

(3) To obtain a reversed negative from an existing negative.

(4) To combine line and tint work.

(5) This process is also used sometimes to improve a negative as the powder negative is generally denser than the Photographic negative.

19. There are scores of formulae for the sensitising solution each containing a gummy substance a hygroscopic substance, a sensitising salt and water. The following has been found to yield satisfactory results :—

Gum Arabic—7 grms.

Gelatine—3.5 grms.

Glucose liquid—14 c.c.

Ammonium Bichromate—14 grms.

Water—225 c.c.

When the humidity of the air is low, a few drops of glycerine are also added.

The gum and gelatine are soaked in water until soft. The other ingredients are then added and the contents warmed and strained. This solution is not sensitive to light until dry.

The solution is coated on the glass plate using the plate coating machine seating the glass plate on a sheet of felt to protect it from shocks.

The negative and the coated plate both being warm and dry are arranged in the printing down frame and exposed to light. As the film is very sensitive to light the exposure is short. The plate is then allowed to absorb moisture in the dark room for a minute. It is then laid on an illuminated ground glass, film side up, a small quantity of very fine lamp black powder is put in the centre of the plate and by a rapid motion of a brush or a pad of cotton wool it is spread over the plate. The powder must be kept rapidly in motion till the negative is fully developed. The clear space where the tackiness had disappeared due to the action of the light will begin to stand out in a minute. Nothing should be done to hurry matters and the plate should be allowed to become as cold as the surroundings. All superfluous powder is brushed away with a clean brush.

The yellow colour left behind by the film has to be removed. This can be done by allowing the film to dry and washing in water. This sometimes results in some of the powder being lost resulting in the negative loosing density. This may be overcome by using a mixture of 8 parts of methylated spirit, 1 part of sulphuric acid and 4 parts of water.

20. *Retouching of Negatives.*—Negatives will be retouched using either photo opaque or Indian Ink. To protect the negatives from the action of insects and to prevent cracking of films a little of carbolic acid and glycerine may be mixed with the Indian Ink. The Indian Ink should be mixed properly. A small quantity of

water is taken in a smooth saucer. The Indian Ink cake is rubbec in it till a thick paste is obtained. To this paste a drop of carbolic acid and glycerine are added and the paste is diluted to the working consistency by the addition of the minimum amount of water. In addition to spotting out pin-holes the negatives are colour separated accurately in accordance with the colour patterns. Negatives are also corrected, this being done usually by blocking out the defective work and cutting in the correct work.

Printing down to metal.

21. *Basic principles of Lithography.*—Lithography which was invented in 1796 by Alois Seneielder of Prague is mainly based on the following principles :—

(*a*) Affinity that greasy bodies have towards each other and their repulsion by water or moisture.

(*b*) The penetration or strong adhesion of greasy bodies to calcerous stones.

(*c*) The facility with which water is imbibed by Calcerous stones and metal bodies which are so prepared as to have a porous surface without any adhesion however taking place.

22. *Plate Cleaning and Graining.*—So the metal plates used must have a surface corresponding to calcerous stones, i.e., must have porous surface. This is obtained by a process called graining. New Plates are generally obtained ready grained from the suppliers. Only used plates have to be grained again.

The old work is usually removed by applying a solvent such as Kerosene or Turpentine to the surface. Following this the plate is soaked in a bath containing a 10 percent solution of sodium or potassium hydroxide. This saponifies the remaining grease and lessens the hardened albumen image. It is then washed under the tap and scrubbed using a coir brush.

23. Graining machines are more or less of a standard type consisting of a shallow tray to which can be imparted a horizontal rotary motion with a radius, of approximately one inch. The speed should be variable within certain limits a maximum of 200 r.p.m. being usually adequate. The plate is either clamped or tacked to a false bottom and then covered with marbles of a size suited to requirements. For average Photo litho work these can be either glass or porcelain of about 2.5 cms. in diameter to be used with an abrasive material which has passed through a 100 mesh sieve. Several graining materials are available including pumice powder, ground glass, sand. flint, emery, etc., Generally sand is used and where fine grain is required emery powder is used.

Before the machine is set in motion, water and the graining materials are sprinkled evenly over the marbles. The plate should only be moistured and only sufficient graining material added to give a good cutting effect without clogging or impending the free motion of the marbles.

Only close attention to periodic addition of fresh graining material and water will enable good results being achieved. The final period of graining should be slightly longer, say 15 minutes where the material and water were added at intervals of 10 minutes. The total period of graining will also have to be ascertained only by observation but generally about 45 minutes per plate would be sufficient.

When the graining is judged to be sufficient the plate is removed from the machine and cleaned thoroughly on both sides. It is then dried quickly in a drying rack.

After use, some of the marbles will develop 'flats' or become cube shaped. These should be discarded as they are likely to cause scratches. Scratches are also caused by careless removal of the plate from the machine. The grained tray should be frequently washed out to remove the accumulated mud.

Graining increases the surface of the plate by about five times. This increase in area allows of greater retention of a thin film of water during printing and the maximum amount of gum solution is absorbed. Again each pit in the grained surface serves as a tiny reservoir of water and the closer that the grain peaks are to each other i.e., the deeper each pit is, the more effectively will water be held during printing because of capillary attraction. Again the grain on the plate allows of wear, so that the water retaining property of the plate surface is maintained even after some time. So it may be seen that the depth of the grain i.e. the difference between the grain peaks and valleys is the conditions that primarily determines the nature of the grain. The type of grain produced is influenced by :—

(1) Size of the marbles used.

(2) Weight of the marbles used.

(3) Nature of the abrasive used.

(4) Fineness of the abrasive particles.

(5) Speed of the machine.

(6) Eccentricity of tub oscillation.

(7) Time of graining.

(8) Frequency of addition of fresh abrasive.

(9) Time allowed between final abrasive addition and removing plate from the trough.

(10) Character of metal plate used.

(11) Quantity of water used.

24. Zincographic printing plates are prepared by adopting the following processes :—

(1) The Vandyke process.

(2) Albumen process.

(3) By direct drawing on Zinc plates.

25. *Vandyke Process.*—The original must be drawn on a translucent or better still transparent material. The original should confirm to the instructions given below:—

(*a*) Blue tracing cloth or koda trace should be used for preparing the drawing. If paper is used it must be white or bluish in colour and free from creases or dirt.

(*b*) The work should be perfectly drawn in good black ink so that all parts of drawing are absolutely black and equally opaque. A good test is to hold the drawing up against strong light and carefully examine for any sign of greyness or transparency in the lines.

(*c*) A good quality Indian Ink freshly made up should be used. When drawing on tracing cloth a slight addition of oxgall will make the ink 'take' better. Heavy block letters or border lines may be gone over twice using Photo-opaque the second time. The use of other colours in the drawing is inadmissible.

(*d*) Nothing should be written on the back of the original nor should anything be pasted on either side of it. Erasing should be avoided. The original should be clean both face and back.

(*e*) The originals should not be folded or rolled. They should be kept flat to avoid wrinkles and creases.

(*f*) The drawing as a whole should be neat firm and black.

26. The vandyke process consists of:—

Sensitising.

Exposing.

First development.

Inking and

Second development.

The grained plate is counter etched with a solution made up as follows:—

Nitric acid—30 c.c.

Alum powder—90 gms.

Water—5 litres.

The plate is then dried and coated with a sensitising solution made up as follows:—

Carpenter's glue—30 gms.

Water—170 c.c.

Ammonium Bichromate—4 gms.

Lamp black—2 gms.

The following sensitiser may also be used.

(*a*) Photo engraving glue 50 per cent solids—100 c.c.
Water—100 c.c.

(*b*) Ammonium Bichromate—15 gms.
Water—600 c.c.

Mix (*a*) and (*b*). Add sufficient Ammonium Hydroxide to start change of colour.

If carpenter's glue is used the coating of the sensitiser is made uniform by rolling over the coated plate a cyclostyle roller. If photo engraving glue is used, the plate can be coated with the sensitiser using the plate coating machine.

27. Exposure is made in a vacuum printing frame. If the plate is going to be machined at the direct printing machine the face of the original should be in contact with the sensitised surface. This will ensure also close contact between the work and the sensitised surface. If the plate is going to be machined at the offset machine then the original should be placed face up on the sensitising plate. This means there is the thickness of paper between the drawn design and the sensitised surface. Therefore, in such cases satisfactory results will not be possible unless the material on which the drawing is drawn is thin and transparent. It will also be necessary then to arrange the illumination to give parallel rays. The actual length of exposure must be determined only by trial.

28. After exposure the plate is rinsed in water and placed in a bath of the following dye.

Methyl Violet—5 gms.

Water—1000 c.c.

The methyl violet is first dissolved in a small quantity of Methylated spirit and then the water is added.

The plate is then taken out of this bath and developed. This consists in washing under running water when if the exposure had been correct, the unexposed bichromated glue washes off leaving an image in clear Zinc against a dyed background. It is essential that the lines should be developed quite clear.

Over exposure results in a broken image due to too much hardening while under exposure gives thick lines. After the first development the plate is drained and dried with large sheets of blotting papers. It is then air dried. Defects such as spots and finger marks are gummed out with a thin solution of gum arabic to which a little methyl violet dye has been added to enable the operator to see his work. The edges and large areas are gummed with a small sponge while a fine sable brush is used for the finer spotting. The plate is again dried.

29. The plate is then laid on the table and a little vandyke ink is poured in the centre of the plate and spread evenly and thinly by a cloth pad. It is important that the ink is rubbed thoroughly and firmly into the grain of the metal. It is then dried under the fan. The plate is then dusted with a mixture of equal parts of french chalk and powdered plumbago. It is then immersed in boiling water. The boiling water loosens the stencil of hardened glue which can be washed away using a soft sponge or plug of cotton wool and a little carbonate of magnesium Spots and scum if any are removed with a pointed stick and pumice powder. It is then immersed for about a minute in a bath containing a very dilute (10 c.c. of concentrated hydrochloric acid mixed with 5000 c.c. of water) and washed well, dried and gummed up. It is now ready for being passed on to the Press.

The vandyke ink is made as follows:—

(*a*) Litho writing ink—50 gms.
Burgundy pitch—100 gms.
Turpentine—300 c.c.

(*b*) Asphaltum powder—300 gms.
Benzene—300 c.c.
Turpentine—300 c.c.

(*c*) Chalk black litho ink—200 gms.
Oil Olive — 30 c.c.

Melt the burgundy pitch and then add sticks of litho writing ink with constant stirring till they are dissolved. Remove from the fire and add the 300 c.c. of Turpentine a little at a time stirring continuously.

Grind the asphaltum to a fine powder and add the Benzene to it letting it stand for some hours with occassional stirring. Then add the 300 c.c. of turpentine.

The chalk black litho ink is put in a small iron pot with the olive oil and the two are mixed with the aid of gentle heat and stirring. This is a slow job and must be done carefully as the ink is easily burnt. When the mixing is finished, (*b*) is added very gradually with constant stirring until all is dissolved. Mixture (*a*) is now added and if all the mixing has been done properly the resultant liquid must be smooth, oily and free from lumps of any kind. It is now strained through a cloth to remove any insoluble particles. The ink will keep for a long time if kept properly in a wide mounted stone ware jar covered with a screw cap. The ink should be shaken vigorously before taking up for use as the various ingredients are inclined to separate out after standing for sometime. If necessary, the ink may be thinned using a mixture of 20 c.c. of turpentine and 5 c.c. of benzene.

Owing to the inevitable distortion of the material on which originals are drawn and consequent difficulties in registration, it is not normally practicable to use the vandyke process for producing work in more than one colour. By adopting this technique originals can be reproduced only to the same scale. Reduced or enlarged prints cannot be obtained.

30. *Dyed Glass Print.*—A slight modification of the vandyke process is made use of in preparing dyed images on glass plates. the sensitiser is as follows :—

Carpenter's glue—30 gms.
Water—100 c.c.
Albumen Helio Solution—30 c.c.
Ammonium Bichromate—2 gms.

(or)

Photo engraving glue 50 percent.
solids—60 c.c., Water—200 c.c.

(*b*) Egg Albumen Flakes—40 gms.

Water—200 c.c.

(*c*) Ammonium Bichromate—10 gms.

Water—200 c.c.

(*a*), (*b*) and (*c*) are mixed in equal quantity and allowed to stand overnight before use.

A clean glass plate is coated with the sensitiser and dried. It is then exposed in the frame under the negative. A piece of black paper should be placed against the back of the coated glass to eliminate the effects of halation. After exposure the coated plate is developed by washing in a gentle spray of water. After development the following dye is poured over the plate.

Methyl violet or Methyl Blue—5 gms.

Water—1,000 c.c.

The dye colours the hardened glue and thus the dyed print is obtained.

31. *Albumen Process.*—In this process chromatised albumen solution is used instead of Chromatised glue solution. The plate is first of all counter etched as usual with the following solution:—

Nitric acid—30 c.c.

Alum Powdered—90 gms.

Water—5 litres.

This solution not only cleans the surface but also deposits on the surface of the Zinc a tough film of basic aluminium sulphate and basic Zinc sulphate thereby conditioning the plate surface for the absorbtion of fatty acids. 8he plate is next pre-etched with the following solution:—

Gum solution 14 Beamue—2 litres.

Water—900 c.c.

Ammonium Bichromate—30 gms.

Phosphoric Acid—60 c.c.

After counter etching and washing and rinsing sponge the plate with the pre-etch mixture for a period of two minutes, and rinse with water without drying. This pre-etching is particularly helpful in enabling the plates to develop clean and indiminishing any tendency to scum on the press.

The pre-etched plate is then coated with the chromatised albumen. This coating is done at the plate coating machine. It is necessary to have an even coating. Generally coating is done initially at a speed of 30 r.p.m. which is gradually increased later on to 80 r.p.m. The factors which control the coating thickness are—

(1) Viscosity of the coating solution.

(2) Speed of the coating machine.

(3) Relative humidity of the air inside the coating machine.

(4) Temperature and

(5) Plate grain.

The sensitivity to light of the bichromate film depends upon—

(1) The relative humidity of the printing room atmosphere.

(2) The relative amounts of bichromate and albumen present.

(3) Acidity of the solution.

(4) The time of standing of the mixture after preparation.

(5) Pressure in the printing down frame.

The sensitiveness of the solution is directly proportional to the relative humidity of the printing room. Practical work has demonstrated that an exposure of approximately 4½ minutes at a relative humidity of 50 percent is equivalent to an exposure of 6½ minutes at a relative humidity of 35 per cent. In view of this it is necessary that the coated plate be allowed to remain in the printing down room after removal from the coating machine in order that the coating may be in equilibrium with the surrounding atmosphere during exposure.

The addition of a large amount of bichromate increases the sensitivity of the film but if too much be added, crystals of bichromate may form on the film after drying, leading to the powdering or peeling of the film. The ratio generally accepted is:—

Bichromate: Albumen: 1 : 3.

When expressing this ratio the dry weight is taken.

Sensitivity increases with increase in acidity. However, high acidity reduces the time during which the solution may be stored before use. The acidity of a coating changes on drying down, due to loss of free ammonia and to interaction between chromate and bichromate salts and the metal plate.

The sensitivity of the bichromate mixture alters with the time of standing because of changes which takes place in the system. It goes on increasing in sensitivity and reaches maximum sensitivity when about 24 hours have elapsed after preparing the solution. On further standing, the mixture commences to become dark in colour. A solution may be used for a period of 72 hours from the time of its preparation.

The addition of compounds other than bichromate serves mainly to increase sensitivity or prevent souring caused by the presence of bacteria Compounds like phenol, Sodium Salicilate etc. act as preservatives. The addition of compounds which increase sensitivity is important when considering direct projection where exposures are inconveniently long. Substances like potassium, ferro cyanide, Chlorides of copper, nickle, cobalt etc. are supposed to increase the sensitiveness of the solution.

The solution is normally prepared as follows.
Stock solution :

(*a*) Albumen, dry flakes—500 gms.
Water— —2.5. litres.

Bring this solution to read 5° Beamue by the addition of water if need be.

(*b*) Ammonium Bichromate—500 gms.
Water —2 litres.

(*c*) Ammonium Hydroxide 28 per cent—200 c.c.
Water —1 litre.

To 1300 c.c. of (*a*) add 150 c.c. of (*b*) and 150 c.c. of (*c*) add about 700 c.c. of water and bring the solution to read 5° Beamue.

32. New-comers to the Trade should be warned against carlessness in handling the bichromate either in the powder or the liquid form. Once the skin is affected one becomes doubly sensitive. So every care should be taken right from the start to see that neither fine particles are allowed to float in air nor solutions remain on the hands. Provided such reasonable precautions are taken, the majority of workers need have no compunction in handling the bichromate to the extent necessary in Photo Litho manipulations.

33. The coated plate is placed on the bed of the vacuum frame (assuming a face up frame is being used) and the negative which has been carefully dusted both back and front, is placed film down on the plate and in the required position relative to the gripper edge and side of the plate. A selection of straw board strips of various sizes and thicknesses should be available and sufficient of these are placed around the negative to prevent plate being pressed over and indented by the edge of the glass The masking paper if any used, the straw boards etc., should be perfectly dry.

The surface of the glass plate which will be in pressure contact with the back of the negative must receive special care and attention. The smallest piece of hard paper dried gum etc., is likely to result in a broken negative or in the frame glass being broken. Small particles of grit or gum may easily pass unnoticed by the eye but rarely escape touch. Therefore, the hand should always be drawn across the glass surface before lowering the frame into position. All the natural and obvious precautions for glass should be taken.

After locking the frame, the air is exhausted out and when maximum pressure has been reached the plate is exposed either to sun light or light from open arc lamps. When the exposure is over, the motor is shut off, the frame just opened so that air could rush in and then the negative removed. The plate is then inked with the following ink.

Chalk black litho ink—10 gms.

Turpentine—50 c.c.

Benzene—100 c.c.

34. The ink is applied with cloth pads and is rubbed gently over the entire exposed surface of the plate. The Turpentine and Benzene are allowed to evaporate and the plate is then dusted with chalk for ease of wetting in development. It is then developed under running water until all the unexposed portions of the coating have all washed away. A positive image of the work is thus left on the plate in hardened albumen and greasy ink. Development is assisted by swabbing gently with wet cotton and the print may be sharpened by applying a weak solution of Sodium Carbonate or by treating it with weak ammonia. It is important

that all traces of residual albumen are removed. For this purpose Zinc plates are treated with the cronak solution. It is prepared as follows :—

Sodium Bichromate...12 gms.

Water—-700 c.c.

Sulphuric acid sp. Gr. 1.84—2 c.c.

The plate after washing and rinsing is coated for a minute with this solution. The plate is then washed, rinsed and closed with the following.

Ammonium Nitrate—500 gms.

Ammonium Phosphate—50 gms.

Acid Phosphoric—25 c.c.

Water—750 c.c.

For use, take 100 c.c. of this solution and mix it with 300 c.c. of gum solution. The etch is rubbed down and dried and this treatment is given again. Thereafter the plate is rinsed, washed and gummed up. It is now ready for being passed on the prover.

35. Direct drawing on Zinc-Plates:—This method is adopted for solid patches of colour, like light blue for water spread areas, green for forest area etc. This technique is also adopted to prepare the plates for the boundary ribands. In conjuction with the use of the 'Air Brush' this technique is used to indicate by means of a spray effect, the sea. The Zinco draftsman is provided with an indelible set off on the Zinc plate from the mother plate (or the combined outline plate) A grey impression is pulled from the mother plate on seasoned rag paper. While wet this impression is dusted with the set off dye. The paper is then flicked to remove superfluous powder. It is then placed face down in the appropriate position on a counter etched Zinc plate and run under the press. The impression is transferred on to the Zinc plate Then to make the set of indelible it is covered with paper soaked in a mixture of carbolic acid and turpentine and again run under the press. The carbolic acid turpentine mixture makes the Dye sink down the grains of the plate thus making the set off indelible.

The plate is then dried and passed on to the Zinco Draftsman.

The dye is prepared as follows:—

(*a*) Magentacrystals—100 gms.
Rectified Spirit—250 c.c.

(*b*) Ultra marine blue powder (Best quality)—100 gms.
Rectified Spirit—250 c.c.

(a) and (b) are mixed together and to this is added in small quantities 400 gms. of fine starch powder. It is left overnight. In the morning the supernatent liquid is drained off. The residue is dried in shade. The caked stuff is ground into a powder and sieved through fine cloth.

The carbolic acid turpentine mixture is as follows:—

Carbolic acid—75 cc.

Turpentine—200 c.c.

A proofing paper of the proper dimension is painted with this mixture and is hung up in the machine room. When almost all the mixture has evaporated, the paper is used.

The zinco draftsman paints using litho writing ink those areas that are to print, using for his guidance a colour pattern prepared for that purpose. When the work is over he marks the cut lines also. When the ink has dried the plate is dusted with chalk and gummed up. It is now ready to be passed on to the prover.

If the grey impression pulled was very wet or if the flicking was not done properly or if the set off powder was moist or if too much of carbolic acid turpentine mixture was used, the set off impression will present a smudgy appearance. It is also preferable to prepare such set off at the Broadway Press as in such presses only the shorter, side of paper will pass under the scrapper thus reducing the length of paper that is subjected to stretch. When the set off plate has been prepared its dimensions and its position on the plate should be checked before passing it on to the Zinco draftsman.

36. Photographic set off.—Sometimes a set off is obtained by photographic means. For this purpose the Zinc plate is rinsed with.

Water—1.000 c.c.

Ammonium Hydroxide—125 c.c.

It is then coated in the coating machine with the following solution:—

(*a*) Ferric Ammonium Citrate—40 gms.

Citric acid, Crystals—60 gms.

Water—600 c.c.

(*b*) Potassium Ferri Cyanide—40 gms.

Ammonium Bichromate—1 gm.

Water—200 c.c.

Mix three parts of (*a*) and one part of (*b*) just before use and add just sufficient ammonia to change the colour of the solution, from green to bronze. The speed of coating should be about 30 r.p.m. due to thin consistency of the mixture. After the coating has been dried it is exposed in contact with the negative and then developed either with water alone or with a 1 per cent solution of Ferric Chloride. The plate is then dried in the shade and gummed up. Next day it is washed and counter etched with the nitric acid alum solution, dried and passed on to the Zinco Draftsman.

The litho writing ink used by the Zinco Draftsman is prepared as follows:—

Bees Wax—100 gms.

Tallow—100 gms.

Lamp Black—25 gms. well ground.

Chalk Black, Litho Ink—25 gms., in 100 c.c. of Turpentine.

Dry, Soap shavings (good quality)—100 gms.

Shellac—100 gms.

The ingredients are melted together in an iron pot except the lamp black and one half of a soap. The mixture with constant stirring is kept on fire till it etches fire and is kept burning till the mixture is reduced to about one half. The flame is then put out and the other half of the soap and lamp black is added. The whole is then well mixed and when cooled a little, is poured into a convenient flat dish and cut into cakes.

37. *Prints on paper.*—When only a small number of copies are required there is no need to prepare a printing plate and pull impressions therefrom. Paper may be sensitised with salts and prints taken on those papers straight away.

(1) Negative blue print (Ferroprussiate print)

(2) Cyano type copies.

(3) Positive blue prints.

Negative blue print.—Two solutions are made as follows:—

(*a*) Ferric Ammonium citrate
(Preferably green scales)—10 gms.
Water—50 c.c.

(*b*) Potassium Ferric Cyanide—10 gms.
Water—50 c.c.

For use mix equal parts (*a*) and (*b*) though these stock solutions will keep for a long time, they will not keep for any length of time.

This solution is applied to the paper by means of a sponge which is fully charged to begin with. After the solution has been applied all over the paper the sponge is squeezed out and then applied to the paper again to absorb the superfluous solution. Coating should be carried out in weak day light and the paper may be dried by the application of gentle heat. If not used that day itself, the coated paper generally deteriorates.

The tracing to be produced is kept in contact with the coated and dried paper and exposed. On exposure light passes through the paper reducing the Ferric Iron in giving those places into ferrous iron which reacts with those potassium ferric cyanide giving a blue pigment. But in the portions just below the drawing the iron remains in the ferric conditions itself and this iron does not react with postassium ferric-cyanide. So when the exposed print is washed with water the salts in the portions below the drawing are washed away leaving those places white. In the other places the ferrous iron reacts with the ferric-cyanide giving a blue colour. Thus we get a negative image of the drawing. The print is washed well and dried.

As the print is obtained by wet development the paper used should be fairly strong. Usually in the department rag litho paper is used.

By adopting this technique we can only get prints which are on the scale as the original drawing. It is not possible to obtain reduced or enlarged prints.

Cyano-Type Copies:—

The technique is the same as for negative blue prints but instead of exposing the coated paper under a positive original it is exposed under a negative. So we get a positive print. As it is exposed under a negative it is possible to obtain prints which are either on the same scale or on a reduced scale or on an enlarged scale than the original drawings depending on the scale of the negative.

Positive blue print.—The sensitiser is made up as follows :—

(*a*) Gum Arabic—33 gms.
Water—200 c.c.

(*b*) Ferric Ammonium Citrate
(Preferably green scales)—44 gms.
Water—50 c.c.

(c) Ferric chloride (lumps)—27 5 gms.
Water—50 c.c.

To (*a*) add (*b*) then (*c*) in small quantities with constant stirring.

The paper is coated with this solution dried and exposed under the original. As in the previous case light passes through the paper and reduces the ferric iron in those places into ferrous iron. But in the places below the drawing, the iron remains in the ferric condition. Now the print is developed by using a saturated solution of potassium ferro cyanide which reacts only with ferric iron giving a blue colour and not with ferrous iron. The result is therefore a positive in blue. To clear the back ground the print is soaked in a 4 percent solution of sulphuric acid and washed in water by rubbing with plugs of cotton wool and dried.

As the print is obtained by wet development, the paper used should be fairly strong. Even when a strong paper is used, the cellulose fiber are affected by the sulphuric acid with the result that the print will after the lapse of a few months, become brittle and crumple to powder. In the department usually all rag litho paper is used.

By adopting this technique we can only get prints which are on the same scale as the original drawing. Reduced or enlarged prints are not possible.

Ozalid Prints.—This technique yields a positive print from an original on the same scale as the original.

Ozalid sensitised paper is sold in rolls. These are purchased, cut to the required size and used. Prints are made by exposing the coated paper and intensity of illumination. Incorrect exposure will result in the loss of details or intinting of the back found.

The correct exposure for an original of a particular quality can be determined after some experience depending on sensitivity of the coated paper and intensity of illumination. Incorrect exposure will result in the loss of details or in tinting of the background.

Ozalid is a dry development method unlike Ferro Prussiate or Iron Positive Prints where the prints are developed in water or solutions in water. As strong reagents like sulphuric acid are not used the paper is not affected as in the case of iron positive prints.

38. *Proving.*—As soon as the plate is received from the printing down section it must be subjected to what is called 'Etching'. The term etching is used here in a different way. True etching consists in removing a portion of the printing plate on the non-image portions so that the work is left standing in relief. This is not what is done here. By the application of the etch the metal

in the non-image portions is rendered insensitive to grease. Usually the etch applied to Zinc plates consists of a mixture of phosphates, Ammonium Compounds and gum solution. For Zinc plates phosphoric acid alone is not satisfactory as the Zinc phosphate is soluble in the acid. Therefore, the ammonium salts are added which causes precipitation. The compound formed is Zinc ammonium phosphate. If the PH of the etch is adjusted to 2.5 maximum is absorbed, thus creating maximum desensitisation of the non image portions. The mixture of ammonium nitrate, phosphate, phosphoric acid and gum mentioned for etching the plate after printing down can be used here also. The plate is washed and the etching solution spread over it by means of a sponge. The solution is rubbed in the plate and allowed to dry. The plate is then washed and gummed up and dried. A small quantity of the washing out solution is then spread over the plate. The washing out solution attacks the developing ink used while preparing the plate, but does not attack either the hardened albumen or the fatty acid. On the other hand a solid deposit of tallow, Bees wax and Asphaltum is on the lines, where the work had been and this forms a firm foundation for the printing ink to adhere. The superfluous washing out solution and the developing ink are removed by a dry ball of cotton waste. A few drops of water are sprinkled on the plate and the plate developed well. More water is added and the whole plate is washed thoroughly. The excess water is removed and the work rolled up by means of a hard roller with a firm and even pressure. The process of damping and inking is repeated till the work is sufficiently charged with ink. This could be easily judged by experience.

Then the plate is dried, a sheet of paper placed over it and an impression taken at the hand press.

Generally proofs are pulled from direct printing plates at the power transfer presses which are long way scrapper presses run by means of electric power. That is, in those presses the longer side of the paper passes under the scrapper. But for pulling indelible-set offs and for transfers it is better to use the Broadway press which is also a scrapper press run by means of electric power. But here the shorter side of the paper passes under the scrapper which instead of being of wood is made out of steel. The Broadway press has a frame attached in which a blanket could be stretched. When so done, the press can be used for pulling proofs from an offset (i.e.) direct reading plate also. But it is preferable to prove such plates at the flat bed offset proving press which may be either hand operated or power operated.

The press consists of two bed plates, one the plate bed to take on the plate and the other the printing bed to take on the paper. A metal cylinder over which a rubber blanket is stretched can be

passed over the two bed plates. By suitable mechanism it is so arranged that the cylinder on forward journey contacts both the beds, but does not do so on its backward journey. Therefore, the blanket stretched over the cylinder takes the impression from the plate on the bed plate and transfers it on to the paper on the printing bed.

For work in colour generally impressions are taken first from the outline plate which will be printed in black. The other colours are proved successively adjusting registry either by sighting through register marks or if the press is provided with front and side, lays by carefully registering the paper to these.

The washing out solution is prepared as follows:—

The following articles are required to prepare the washing out solution.

Tallow	—50 gms.
Bee's Wax	—50 ,,
Asphaltum Powder	—100 ,,
Oil of Lavender	—25 c.c.
Turpentine	—2 Litres.

The tallow is melted in a sauce pan. To it is then added the Bee's wax in small quantities at a time till the whole is melted. The asphaltum powder is then added in small quantities at a time with constant stirring till the whole has formed a homogeneous mixture. The sauce pan is then taken away from the fire and the turpentine is added with constant stirring. When the whole has cooled down a bit, it is decanted into a stone ware jar and the oil of lavender is added and mixed to it.

Small additions, etc. to the plate are made by adopting the transfer technique. A Lithographic transfer is an impression or a drawing which has been made with a greasy ink on a specially coated paper. This surfaced paper is a convenient carrier of the image forming ink and is the means where by the image is carried to a Lithographic Printing surface. The transfer paper is made as follows:—

(a) Galatine	— 5 gms.
Water	— 50 c.c.
(b) 1. Arrow root	—20 gms.
Water	—200 c.c.
2. Middle chrome powder	—5 gms.
(c) Flour Maida	—20 gms.
Water	—200 c.c.

The arrow root and the flour maida should be well cooked.

To (*b*) add (*c*) in the consistency of a thin cream and finally (a) Coat paper once and dry. Coat again the next day and dry again.

The drawing or impression in greasy ink is obtained on this coated paper. It is then carefully moistened at the back and placed image in contact in the appropriate portion on the counter etched zinc plate and run under heavy pressure in the press. Due to the pressure the image is transferred to the counter etched zinc plate and reacting with the metal surface forms the litho image.

39. Printing is conducted in exactly the same way as proving. The plates after proving are handed over to zinco drawing section where they are examined and any correction required is attended to. The plates are again proved to find out whether the corrections have been properly attended to. Then in the case of plates used for printing in black, the work is washed out and rolled with a roller charged with the minimum amount of black ink. It is then gummed and handed over to the machine printer along with the connected records like the first proof, the machine proof, the press order proof etc. In the case of colour plates, after pulling the machine proof, work is washed out and the plates gummed, dried and handed over to the machine printer, with the connected records.

A machine printer must have a good knowledge of Litho printing and a good eye for colour. He must have a practical mechanical knowledge of the machine which is allotted to him. He is personally responsible for oiling, cleaning and general maintenance of the machine. He should attend to all adjustments required like adjustment of the plate bed of the Flat Bed Machine, adjustment of the inking and damping rollors, adjustment of the proper pressure between the plate Cylinder and the blanket cylinder, the blanket cylinder and the impression cylinder, adjustment for the stretch of the paper etc. Unless all the parts are kept clean and properly adjusted there will be a series of troubles one leading to another. For instance the machine may be adjusted for too much pressure following the use of a blanket in poor condition. This may be due to use of inferior blanket wash or faulty treatment etc.

Paper before use in the printing process is hung in the machine room for about a week to 'Condition' it to the temperature and humidity of the machine room, in order to minimise distortion due to expansion and contraction and to prevent the sheets sticking to the feed board during, 'laying on'. As distortion of paper is always likely to be greater across the grain of the paper than along

the grain it is advisible to feed the paper to the machine with the grain of the paper parallel to the grippers. Any appreciable distortion across the grain of the paper can then be taken up by altering the packing of the cylinder.

As paper stretches slightly it will be better to polish it by running it through the press once before printing actually begins. After a sheet has passed through the machine for one printing it takes about a day for it to regain its normal shape. This limits the speed at which a job in several colours passes through the machine. One printing per day is the normal rate of progress.

The following is the normal order in which the different colours are printed in the Departmental maps.

Black—Outline, place names etc.

Red—National Highways, State Highways, sites, Temple, Mosque, Pagoda, Church, Cart-track.

Dark Blue—Bunds of rivers, canals, lakes, tanks, sea coast, salt-pan, marshy areas, etc.

Pink Binder—District and Taluk Boundaries etc.

Light Blue—Water spread areas.

Green—Forest areas.

Purple—Electric Transmission lines, Electric Sub-station, Telephone sub-station, etc.

Brown—Contours.

ORGANISATION AND ROUTINE

2 (*a*) The Photo Zinco Press is part and parcel of the Central Survey Office. The other section of the Central Survey Office are:—

(1) Drawing Section.

(2) Record Section.

(3) Administrative section consisting mainly of

(*a*) Account Section.

(*b*) Stores Section.

(*c*) Fair copying and despatching section.

All the processes mentioned in para 3 of Chapter XXIII are operated in the Press. The Works Manager is in immediate charge of the technical work. The Manager and Pay Master of the Factory is the Deputy Director of Survey and Land Records incharge of the Central Survey Office, Chepauk, Madras-5.

The duties and responsibilities of the holders of the various posts in the Photo Zinco Press, Central Survey Office, Chepauk are spelt out in appendix II appended to G.O. Ms. 975, Revenue, 9th May 1968. A copy of the same is appended to this chapter.

APPENDIX I.

Group letter	Groups Names.	Trades in the Groups,	Designation.		Groups Trades A to E and Designation Details of Personnels.						
					A.MS	T.AS	R.P. Gr. I	P.P. Gr. II	R.R. Gr. III	R.A.	T.L.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
A	Photo Litho	Negative Making Printing Down to Metals Paper Prints.	Photographers and Negative Keepers Printers Down.	Works Manager Assisted by Assistant Works Manager (General).	Assistant Manager (Photo)	1	1	2	2	4	..
						..	1	2	3	5	3
B	Photo Zinco Drawing.	Photo writing.	Photozinco Draftsman.	Do.	Assistant Manager (Zinco)	1	2	7	7	10	2
		Zinco Drawing.	Do.	Do.		..	2	4	5	4	..
C	Press Machine.	Plate Cleaning and Graining Litho Prooving Machine Printing.	Plate Cleaners and Grainners Provers Litho Printers.	Do	Do.			1	1	4	..
						1	2	2	2	3	2
						..	2	2	2	4	..
D	T.O.	On H.S. Despatching Chemical Paper' etc., Dispensing.	Technical Clerks Despatchers Press Store Keepers.	Do.	Do.	1	1	1	3	..	..
							1	1	1	1	1
							1	1	1	2	1
	Mounting.	Map Mounting.	..	Do.	Do.		1	2	3	5	
						will work Directly under A.M. (Genl.)					
			Grand Total ..	1	2+1	4	14	25	30	42	9

APPENDIX II.

DUTIES OF THE WORKS MANAGER.

1. Scrutiny and passing of work done in the Photo Zinco and Map Mounting Sections.

2. Issue of instructions in regard to methods of reproduction and treatment.

3. Passing of estimates and cost Statements of village and other departmental maps and extra departmental items.

4. Suggesting ways to overcome snags and troubles in the working of the machinery and processes in the Photo Zinco and Mounting Sections.

5. Passing monthly indents for chemicals, papers litho articles etc.

6. Testing chemicals, inks, Paper, litho Articles etc.,

7. Periodical review of stock position of chemicals, litho articles and paper.

8. Scrutiny of the forecast of articles to be imported and testing articles imported.

9. Compliance in so far as the workspot is concerned of the provisions of the factories and other connected legislation and scrutiny of registers maintained under these acts which pertain to the workspot.

10. Technical and administrative correspondence pertaining to indents received for reproduction and printing and mounting work and very urgent items of repair work and of purchases.

11. Preparation of Collodion, Iodizer set off powder and other importent Chemical compounds, Solutions, Washes etc.,

12. Inspection adjustment of machinery and supervision of erection of machinery.

13. Arrange for practical training of candidates whose training is ordered by competent authority.

14. Arrange to send intimation of accidents etc., to the Factories and Police Departments and arrange for rendering first aid or hospitalisation of those injured.

15. As a member of the two men and three men committees, scrutinising and passing requests for the purchase of Reproduction stores.

Litho and offset inks.
Tools and Petty plants.

Reproduction, Printing and Mounting Plant and machinery spare parts, Bazaar Articles and Chemicals.

Map mounting materials and repairs of reproduction, printing and mounting plant and Machinery.

16. Personal inspection of articles purchased under orders of the two men and three men committees and repairs effected under the orders of the two committees.

17. Scrutiny and condemnation of articles put up to the two men and three men committees for condemnation.

18. Assist the Head of the office in cases where the Head of the office considers it necessary to get his opinion.

DUTIES OF ASSISTANT MANAGER (GENERAL)

1. Scrutiny of the attendance register of the Photo Zinco and mounting sections.

2. Regulate issue of work to the Photo, Zinco and Mounting Sections.

3. Grant casual leave.

4. Pass invoices relating to supply of proofs, grey and drawing blue prints printed copies etc.

5. Scrutiny of cost slips and estimates.

6. Execution of confidential indents.

7. Scrutiny of outturn registers of Photo Zinco and Mounting sections before putting them upto printing and Works Manager.

8. Arrange for submission on due dates of the various periodicals.

9. Scrutiny of the account books of chemicals, litho articles map mounting materials etc., maintained in the Photo, Zinco and Mounting Sections.

10. Submission of leave applications with remarks for orders.

11. Initiating action for officiating arrangements.

12. Arrange for preparation of monthly indents on Central Survey Office stores for paper, chemicals, inks, litho Articles etc.,

13. Personal inspection of unserviceable articles before their being sent to Central Survey Office store for disposal.

14. Tendering Technical advice to representatives of other deparments for preparation of drawings for reproduction.

15. Scrutiny of the personal registers maintained by the ministerial assistants working in the Press.

16. Tendering advice to the ministerial-assistants engaged on procurement of inks, chemicals, litho articles, etc., when required

17. Look after the mounting section and attend to correspondence pertaining to indents for mounting.

Assistant Manager (*Photo*).—Being in charge of Groups A and B (Photo Lithos and Photo-Zinco Drawing).

Should possess complete practical working knowledge of wet plate negative making, powder process for duplication of negatives and processes (mainly albumen and reversal) adopted for preparing plates. He should also have a complete knowledge of the methods adopted for preparing dyed glass prints, paper prints, etc., Negative retouching, couour separation, negative engraving and corrections, drawing. Correction, aerograph work, etc. and impart practical training to all the personnel working under him.

2. Should examine all originals, etc. and the instructions issued in the register slips and issue such instructions as may be necessary to carry out the register slip instructions before putting any work in hand.

3. Pass and initial with date all wet plate and powder negatives before they are issued for work.

4. Be responsible for the safety and good working condition of plant, machinery, instruments and other equipment furniture, fixtures, etc. kept and used in the sections under his control.

5. Maintain all registers, stock books and diaries, etc., maintained for providing materials for various reports.

6. Maintain daily, monthly reports, etc. and also record register slip cost of work done.

7. Is responsible for seeing that the technical efficiency of the section is maintained at the highest level. Must arrange for work passing steadily through the sections.

8. Is responsible for enforcing provisions of the Factories and other connected legislation in so far as the sections under his control are concerned.

9. Must enforce cleanliness and punctuality. Must teach the trade to his subordinates and maintain probable dates furnished.

10. Must pass daily indents for paper, chemicals litho and bazaar articles, etc.

TECHNICAL ASSISTANT (PHOTO LITHO).

1. Must have a complete practical knowledge of wet plate negative making powder process for duplication of negatives and processes (mainly albumen and reversal) adopted for preparing plates. He should also have a complete knowledge of the methods adopted for preparing dyed glass prints, paper prints, etc.

2. Examine negatives and positives before issue and give such instructions as may be necessary to obtain the best possible results and carry out R.S. instructions.

3. Examine and initial with date all passable plates.

4. Must guide the assistants and impart practical training to persons working under his control.

5. Scrutinise daily indents for paper, chemicals, litho and bazaar articles, etc. before putting up the same to the Assistant Manager.

6. Maintain all registers, stock books, diaries, etc., kept for providing materials for various reports.

7. Should have a knowledge of the provisions of the factories and other connected regulations to enable him to enforce the same and is responsible for maintaining the technical efficiency of the work in the section at the highest level.

TECHNICAL ASSISTANT (PHOTO ZINCO DRAWING).

1. Should possess complete practical working knowledge of the section and be able to impart good practical training to the personnel working under him.

2. Examine negatives and plates before starting work and issue clear and complete instructions that may be necessary.

3. Examine and initial with date all negatives and plates passed by him as having been attended to and ready to be passed on to the succeeding section.

4. Maintain all registers, stock books, diaries, etc. kept for providing materials for various reports.

5. Scrutinise daily indents before submitting the same to the Assistant Manager.

6. Marshal negatives to be fed on to the plate making section and marshal plates for being fed on to the machines.

7. Should have a knowledge of the provisions of the factories and other connected regulations to enable him to enforce the same and is responsible for maintaining the technical efficiency of the work in the section at the highest level.

PHOTOGRAPHERS AND NEGATIVE KEEPERS.

Reproduction Personnel Grade I:

(i) Join up in correct position originals in more than one piece.

(ii) Operate the reproduction Cameras.

(iii) Reproduce-Reduce or enlarge to dimensions required to absolute accuracy.

(iv) Equate and deal with distortion of originals to the extent possible.

(v) Must have a thorough knowledge of scales, symbol tables foot notes, etc. of maps to enable him to use the correct ones.

(vi) Maintain camera and studio equipment.

(vii) Must be able to carry out all connected operations of negative making and duplication of Negatives by powder process from start to finish.

(viii) Follow Register slip instructions.

(ix) Arrange to recondition Silver Nitrate and other solutions used in wet plate negative making section.

(x) Assist the Assistant Manager (Technical Assistant) to maintain the registers required to be maintained in the negative and powder section.

PHOTOGRAPHERS AND NEGATIVE KEEPERS.

Reproduction Personnel, Grade II.—

(i) Prepare solutions and Powder Process Duplicate Negatives by Powder process.

(ii) Make combinations of line and tints.

(iii) Surprint powder impressions on negatives.

(iv) Follow Register slips instructions.

(v) Maintain powder process equipment in proper condition,

GLASS STORAGE.

(i) Safe custody of all negatives and glass plates handed over to him.

(ii) Proper storing of negatives.

(iii) obtaining orders as to whether negatives are to be cleaned or kept unwashed.

(iv) Periodical review of stocks and obtaining orders for cleaning.

(v) Proper arrangement of 'work in progress negative' and issues and receipt' back of negatives every day.

(vi) Prepare chemicals required for glass cleaning.

(vii) Follow Register slip instructions.

(viii) Should attend to section routine work (keeping Ledgers lists card cleaning orders, etc.).

Photographers and Negative Keepers—Reproduction Personnel.

Grade III.

(Studio Assistant).

(i) Assist the photographers in pinning up of the originals on copy board.

(*ii*) Setting up the camera to obtain correct values.

(*iii*) In overcoming distortions on originals.

(iv) Arrange Arc Lamps, keep the carbon trimmed and in position, etc.

Intensification Assistant.—

(i) Fixing, Bleaching and Blackening of Wet plate negatives.

(*ii*) Keeping the fixing and intensification baths upto strength in clean working condition.

(*iii*) Prepare solutions required for intensification and blackening negatives, like copper bromide, Iodine, Sodium sulphide solutions, etc.

(iv) Varnishing negatives, wet collodion and dust on.

(v) Keep equipment, etc, in the intensification room and those used for varnishing in a clean condition.

(vi) Carry dark slide from the dark room to the studio for exposure and back.

PHOTOGRAPHERS AND NEGATIVE KEEPERS: REPRODUCTION ASSISTANT. (NEGATIVE STORAGE.)

(i) Assisting Negative Store-keeper in arranging negatives taken, work in progress, completed in action but awaiting disposal orders and those ordered to be kept unwashed, etc., and arrange and issue negatives for action, etc.

Negative cleaning.—(i) Clean, polish and Albuminise Photographic glass plates

Dark Room Assistant.—(*i*) Sensitise wet plate photographic Glass plates and loading in position in dark slides.

(ii) Carrying dark slide, etc., to the studio and back to the dark-room

(iii) Assist the Photographer in developing exposed negatives, etc.

(*iv*) Take care of chemicals and solutions required in the dark room, viz. Silver Nitrate bath, Collodion, Iodiser, Iodised Collodion, Developer, Redeveloping Solution, etc.

Powder Process Assistant.—Assisting powder process operator in (i) preparation of sensitising solution and sensitising glass plates.

(*ii*) Positioning, exposing, developing, final washing, etc. of the contact negatives.

Photographers and Negative Keepers—Technical Labourers.

Negative Storage—Dusting racks, etc., in which negatives are kept, etc.

Dark room—Keep photographic dark room, equipments like dark slides, vessels and containers like measuring cylinders, glass bottles, etc., clean and tidy always, etc.,

Powder Process.—Cleaning and dusting printing down frame pneumatic, box pattern, etc., pneumatic pumps, operating hand pumps, bearing frames, etc.

Studio—Keeping the Camera Rails, Studio, Ground Glass Screen, etc., neat and tidy always, etc.,

Intensification—Cleaning shelves, cup boards, vessels, bottles, etc., used in the dark room, intensification room, etc.

Printers down Reproduction Personnel, Grade I.

PRINTING DOWN HELIO VANDYKE AND PAPER PRINTS.

(1) Should possess a sound working knowledge of processes adopted for preparing paper prints and printing plates ;

(2) Expose correctly negatives of different types in preparing printing plates.

(3) Prepare blue print on metal plates ;

(4) Plan and print multiple upon the plate ;

(5) Combine two or more negatives|positives in one plate ;

(6) Thorough knowledge of all the equipment and maintaining them in good working condition always.

(7) Be able to read and follow R.S. Instructions.

(8) Make dyed glass prints, etc.

Printers down—Reproduction Personnel, Grade II. Helio Final development.

1. Prepare solutions. 2. Mixing developing ink to the required Consistency 3. Develop exposed Helio plates. 4. Choose plates of proper grain for the work on hand. 5. Knowledge of the working of the equipment (*e.g.*), Pneumatic printing down frames plate drying table, etc.

Vandyke Printing Down and Print Development.

1. Prepare solutions and developing ink. 2. Expose correctly different kinds of reproduction originals. 3. Carryout first development. 4. Choose plate having the correct grain for the work. 5. Follow R.S. instructions. 6. Be responsible for all operations in Vandyke printing down. 7. Knowledge of the working of the equipment (e.g.), Pneumatic printing down frames plate coating whirler, Arc lamps, plate drying tables, etc.

Printers down-Reproduction Personnel, Grade III.
Coating (Helio)

(1) Coat plate by hand and on power driven whirler.

(2) Maintain the whirler in a clean working condition.

(3) Maintain the pneumatic printing down frames, Are lamps place drying table, etc. clean and tidy.

Coating, Inking and Final Development Vandyke.

(1) Prepare sensitising solution.

(2) Coat plate (glass and zinc) by hand and or on power driven whirler.

(3) Gumming up unwashed portions after first development and before inking.

(4) Inking up and chalking the plate.

(5) Carryout final development and finishing.

Paper Prints :

(1) Prepare and handle sensitised paper.

(2) Expose correctly, after test in each case.

(3) Maintain the equipment, Ammonia Printing Machines, Frames (Pneumatic and box pattern) and the sensitised paper in the section safely and in good condition.

(4) Maintain ammonia developing box in good working condition by frequent examination.

(5) Maintain account of the sensitised paper received and expended.

Printers Downs Reproduction Assistants, Counter-etch, Pre-etch, Final-etch, gumming etc., (Helio)—

(1) Counter etching.

(2) Pre-etching.

(3) Loading and Exposing.

(4) Apply plate etch.

(5) Gumming up on the plate.

(6) Ink up exposed helio plates before development.

(7) Receiving glass plates for action from the Retouching section and returning to negative stores after printing down, etc.

Counter Etch, Final Washing, Acid Washing, Gumming, Etc.

(1) Counter etching.

(2) Loading and exposing.

(3) Prepare boiling water and arrange for hot water bath for immersion of plates.

(4) Giving final acid wash.

(5) Gumming up of the plate.

Paper prints:

(1) Assisting the print operator in preparing and or handling sensitised paper.

(2) Expose originals.

(3) Develop the prints.

Printers Down :

Technical Labourers, Vandyke Helio and Prints.

Dusting frames, cleaning containers measuring vessels, etc., washing the electric whirler.

Assist in transportation of plates from place to place, etc.

Photo Zinco Draftsmen—Photo Writing Grade I.

(1) Be able to examine the outline and colour component negatives and mark plainly errors.

(2) Be able to carry out correction against verified proofs.

(3) Draw details and engrave letterings for addition where they are few.

(4) Be able to detect details left in more than one colour and those not in correct positions in colour separations.

(5) Be able to follow R.S. instructions.

(6) Should possess a working knowledge of the duffing medium used in the section and its behaviour due to climatic changes and on long standing.

Photo Zinco Draftsmen, Photo Writing Grade II—

Should be liable to :

(1) Carryout corrections on negatives against verified proofs.

(2) Draw and write direct and reverse fine details and lettering to match with the existing ones in carrying out additions and alterations.

(3) Ink up fine letters to give form and shape to work.

(4) Prepare stencils for tint on dyed glass prints.

(5) Possess knowledge of the importance of Register mark in Colour printing and of sectional marks in work reproduced in more than one section.

Photo Zinco Draftsmen—Photo Writing Grade III.

(1) Should be conversent with conventional signs; symbol tables, special foot notes and other accessories of map;

(2) Be able to open up and strengthen easy letter and details direct and reverse on negatives.

(3) Should be able to separate colour details from combined line negatives with the help of guides and general retouching of negatives, etc.

Photo Zinco Draftsman Photo Writing—Reproduction Assistant.

(1) Stop out pin holes on glass negatives.

(2) Duff out non-printing areas.

(3) Open up fine details of easy work.

(4) Preparing negatives involving simple colour work for helio printing down.

Technical Labourer:

(1) Assist in taking photo-writing of work in progress negatives, proofs, originals, colour patterns, etc.

(2) In receipt and issue of negatives for and after action.

(3) Dust negatives, negative racks, retouching frame, etc.

Photo Zinco Draftsman—Zinco Drawing Grade I.

(1) Have a thorough knowledge of the air brush and be able to use air brush on plates.

(2) Be able to write direct and reverse on plates of minor additions or minute details.

(3) Draw wash areas in accurate accordance with the guide.

(4) Draw boundary ribands to the correct thickness throughout.

(5) Examine finished plates against verified proofs and carryout corrections.

Photo Zinco Draftsman—Zinco Drawing Grade II.

1. Examine proofs of all maps and other work, etc. See that the reproduction corresponds with the originals. Detect and very plainly mark errors from reproduction point of view on proofs. Mark details printed in more than one colour. See that the registration of colours is perfect. See that the impressions are crisp and of good quality.

2. See that work printed in more than one piece is correct at jointure sides of adjacent detail features.

3. Carryout corrections, additions, alterations, etc., on plates while on machines.

4. Ability to judge the grain of the plate.

5. Draw wash areas in accurate accordance with the guide.

6. Draw boundary ribands to the correct thickness throughout.

7. Be conversant with symbol tables and special foot notes.

8. Carryout corrections in the outline and colour component plates against verified proofs.

9. Be able to prepare a key from a coloured original.

Photo Zinco Draftsmen—Zinco Drawing Grade III.

1. Should be able to touch up plates and write direct and reverse on plates.

2. Carryout corrections on village map plates against examined proofs.

3. Should have knowledge of the chemicals and inks used in the section and

4. Incorporate simple corrections on plates against verified proofs.

Reproduction Assistant.

1. Preparation of greasy ink used on plates and knowledge of handling plates prepared.

2. Touch up weak details.

3. Deletion of scum and unwanted details from plates.

4. Ability to draw reversed easy and bold letterings and details.

Technical Labourer.

Assisting Technical Assistant in 1. Keeping work in progress plates, originals, proofs, colour patterns, etc., in racks.

(ii) Issue of plates from rack for daily work.

(iii) Receipt and issue of plates from proving section.

(iv) Operation of the foot pump of the air brush equipment and assist in the movement of the equipment, etc.

Assistant Manager (*zinco*)—Being in charge of Sections C and D (Press and Machines and Technical Office).

1. Should have complete practical working knowledge of plate cleaning, graining, proving, offset and direct litho printing and impart practical training to all the personnel working under him.

2. Should study the register slip and issue such instructions as may be necessary for carrying out those instructions.

3. Maintain all registers, stock books and diaries, etc., maintenance of registers for providing materials for various reports.

4. Maintain daily monthly reports, etc., and also be able to do costing and estimating.

5. Be responsible for maintaining the technical efficiency of the work in the section at the highest level. Must arrange for work passing steadily through the section. Issue strike order for black and white work and scrutinise the strike order copy in other cases before it up to the Works Manager.

6. Be responsible for the safety and good working condition of plant, machinery, instruments and other equipment, furniture, fixtures, etc., kept and used in the section.

7. Is responsible for enforcing the provisions of the Factories Act and connected regulations, in so far as the sections under this control are concerned.

8. Must enforce cleanliness and punctuality and maintain probable dates furnished.

9. Must pass daily indents for paper, chemicals, bazaar articles.

10. Pass and initial with date all proofs, grey prints drawing blue prints, zinc mounted drawing blue prints, etc., issuing out of the Press, etc.

Technical Assistant — Press and Machines.

1. Should have a complete practical working knowledge of plate cleaning, graining, proving, offset and direct litho printing;

2. Examine and initial with date all plates after cleaning and graining ;

3. Must have thorough knowledge of the mechanism and adjustment of the proving and printing presses and maintain them in good working condition always ;

4. Examine all plates before taking up for machining and issue such instructions to the minder as may be necessary for carrying out R.S. instructions ;

5. Maintain all registers, stock books, diaries, etc., kept for providing materials for various reports ;

6. Must guide assistants and impart practical training to persons working under his control ;

7. Should have a knowledge of the provisions of the Factories and other connected regulations to enable him to enforce the same and is responsible for maintaining the technical efficiency of the work in the section at the highest level.

Technical Assistant — Technical Office.

1. Should possess knowledge of all the processes in use in reproduction.

2. Should be conversant with all modifications issue instructions for map reproduction and printing so as to guide the technical clerks to prepare R.S. for each job.

3. Knowledge of the provisions of the Factories Act and connected regulations to see that all records are maintained properly and get the various returns prescribed prepared for approval.

4. Should see that the R. Slips for all routine jobs received are prepared and put up for approval.

5. Should arrange for passing, trimming and despatch of all printed jobs.

6. Should see that the outturn, etc., returns are prepared and submitted in time.

7. Should see that the R.S. costs are added up and entered in the output register.

8. Should get estimates and cost of jobs prepared.

9. Maintain all registers, stock books, diaries, etc., kept for providing material for various reports.

Plate Cleaners and Grainers—Reproduction Personnel Grade II.

Plate keeper.—Should be able to judge if a plate is fit for use or not. Should have a knowledge of the treatment of plates required before storage. Arrange to store plates so ordered. Should have a good knowledge of the routine of the receiving and disposing of plates. Sould be a good plate grainer. Should possess a good knowledge of the Technical routine and maintain registers, obtain cleaning orders, prepare chemicals used for plate cleaning and graining. Should be able to follow R.S. Instructions concerning his section. Take precautions to see that plates are not spoiled by oxidation, development of kinks, edges getting torn and report such plates for condemnation.

Reproduction Personnel Grade III—Plate Graining.

1. Should be capable of producing a good grained plate.

2. Possess knowledge of the type of marbles and abrasives used for producing different types of grain and the schedule of graining.

3. Should possess a knowledge of the working of the graining machines and use of seives of various meshes and slotted plates of various diameters.

4. Maintain graining machines in good condition.

Reproduction Assistants.

1. Clean Zinc plates and prepare them for graining.

2. Knowledge of the operation of the power driven graining machine and assist the grainer in—

1. Cleaning marbles.

2. Removal of materials from the troughs.

3. Cleaning, oiling and greasing the graining machines.

4. Cleaning and drying grained plates.

5. Cleaning the trough, etc., and assist the plate keeper—

Stocking and accounting.

1. (*a*) Polished plates ;
(*b*) Grained plates ;
(*c*) Work in progress plates ;
(*d*) Printed plates.

2. Issuing plates for polishing and graining and receipt of polished and grained plates.

3. Issue of plates for work.

4. Periodical examination and stock taking.

5. Movement of condemned plates to general stores, etc.

Provers: Reproduction Personnel Grade I.—Must be able to i. Renew tympans and rubber blankets of proving process. ii. Prove and Print in Black and colours at the Proving presses. iii. Prepare permanent set off, metal mounted drawing sheets and pull drawing blue prints. iv. Transfer work. v. Maintain the presses in good conditions. vi. Knowledge of the mechanism of proving presses. vii. Read and follow R.S. instructions.

Provers: Reproduction Personnel Grade II.—1. Prepare metal mounted Drawing sheets. ii. Prove in black and in colours on longway scraper presses. iii. Pull drawing blue prints. iv. Prepare plates for machine or for being preserved. v. Print copies in black and in colours at the longway scraper press. vi. Assist proover at the flat Bed Offset Press, in proving and printing in Black and colours. vii. Maintain the presses in good condition.

Provers—Reproduction Personnel Grade III.—i. Treat all type of plates. ii. Pull copies in black and white at the proving presses. iii. Prepare hand rollers. iv. Prepare plates for machines. v. Renew tympans, scrappers leather, scrapers and leather belts. vi. Assist provers in preparing indelible set off of key drawing and in Transfering work. vii. Maintain the presses in good condition.

Provers: Reproduction Assistants.—i. Know the treatment of plates for pulling proofs and of plates to be stored. ii. Knowledge of the use of Gum, etch and washing out solution in treatment of Zincographic plates. iii. Operate proving presses. iv. Grind ink. v. Wash rollers, slabs cylinder blankets, etc., and for change of colour, etc.

Litho Provers Technical Labourer.—Supply of water for processing. Cleaning of the ink-slabs. Knives, scrapers and containers, etc. Keeping the workspot clean of oil, accretions, etc. Cleaning the presses of oil and greases. Cleaning underground shaft area free of dust and dirt, etc.

Litho Printers: Reproduction Personnel Grade I.—i. Print in black and colours at the flat bed and for Rotary offset litho machines. ii. Set dampers and Inkers. iii. Re-cover rollers, cylinders, etc. iv. Adjust printing pressures. v. Should know to read a Micrometer guage. vi. Be able to deal with paper distortions. vii. Examine machine impressions and follow R.S. instructions. viii. Maintain machines in good conditions. ix. Over come minor defects in blankets. x. Remove minor parts and replace them correctly, etc.

Litho Printers—Reproduction Personnel Grade II.—1. Laying on sheets for printing in black and colours.

2. Count paper accurately and rapidly.

3. Should be capable of setting and adjusting " Lays ".

4. Treat plates before and after printing.

5. Assist, the minder in setting inkers, Dampers, Cylinders, etc.

6. Be responsible for oiling and greasing the various parts of the machine daily and as often as may be required and instructed, etc.

Litho Printers—Reproduction Personnel Grade III.—1. Mounting and removal of plates from the machine. (ii) Cleaning the machinery, ink slab riders, Rollers, impression cylinders, etc. after each printing. (iii) Assisting the minder in setting, inkers dampers, etc., and in re-covering of cylinders, dampers etc. (iv) Wash out and damp on the machines before putting on power. (v) Gumming up of plates. (vi) Application of ink on rollers during run, etc.

Litho Printers—Reproduction Assistants.—(i) Sorting papers with clean edges and without folds and stacking them suitable for feeding. (ii) Assist the layer on in feeding sheets. (iii) Cleaning machine rollers, etc., after printing. (iv) Assisting in removal and putting on of the inkers and distributing and damping rollers, etc., and in moving cylinders of machines by hand. (v) Assisting in re-covering of cylinders rollers, etc.

Litho Printers—Technical Labourer.—Bringing water for process work, cleaning the ink slab, knives, containers for chemicals solutions in the workspot, etc., free of oil and dirt, removal of waste, carrying paper to feed board. Carrying finished copies to the despatch section carrying papers to be trimmed or put to guillotine and back, etc.

Technical Clerks—Reproduction Personnel Grade I.—(i) Preparation of R.S. for all routine jobs and under instructions for other items for approval.

(ii) Preparation and scrutiny of returns pertaining to output under Factory, etc., regulations to the statistics authority, etc.

Technical Clerks—Reproduction Personnel Grade II.—(i) Maintain job cards indicating progress of jobs. (ii) Maintenance of fair outturn registers. (iii) Preparation of monthly, quarterly, half yearly and annual returns for Administration reports. (iv) and Maintenance of Registers of cost of work done, etc.

Technical Clerks—Reproduction Personnel Grade III.—Original Keeper.

1. Maintain register of originals, etc., received issued, etc.

2. Assist in preparation of register slips by taking measurements of originals.

Time keeping and Factory Register.—1. Maintenance of Forms, 12 to 25.

2. Assist in the prepartation of half yearly and annual returns under the factories and connected regulations.

3. Assist in the maintenance of registers required for preparation of the returns under the statistics authority.

4. Maintain Health and Safety register.

5. Obtain from accounts section wages particulars.

Technical Clerk—Assist Assistant Manager (Photo) in writing diaries, receiving and despatching originals, prints, etc., and assist him in preparing the daily, monthly, etc., reports.

Despatchers—Reproduction Personnel Grade I.—Know the mechanism and working of the Guillotine. Should be a good impression examiner. Study each R.S. on completion of printing job and issue necessary instructions for trimmings. Maintain register of jobs despatched and furnish daily reports of maps, etc., supplied to the outturn section. Despatch all printed materials with the originals, necessary guides, etc. Be able to maintain registers records, etc, prepare daily, monthly, etc., reports and do costing and estimating.

Reproduction Personnel Grade II—Impression Examiner.—Should possess good colour sense. Examine impressions against R.S. instructions and originals. (i) as to quality and quantity. (ii) as to registration being perfect. (iii) that no details are printed in two colours. Be able to follow R.S. instructions, Maintain register of overs, etc., returned to "Paper Stores".

Reproduction Personnel Grade III Guillotine Operator.—(i) Oil and Grease the Guillotine machine (Paper and plate) maintain the machine in good condition. Maintain the Registers for the No. of cuts done each day. Trimming of copies and cutting papers' correctly. Cut Zinco plates to the given dimensions and Grind Ink, etc.

Reproduction Assistant.—Assist Despatcher in (i) Receipt of printed copies. (ii) Counting passed impressions. (iii) Despatching of copies and one side sheets, and assisting Guillotine operator in Collecting (iv) Knocking up of the sheets to be trimmed.

Technical Labourer.—1. Carrying printed copies to guillotine and trimmed copies to despatcher.

2. Packing of copies.

3. Carrying overs and cancels, etc., to Store-keeper.

4. Carrying copies and originals, etc., of maps.

Press Store-keeper—Reproduction Personnel Grade I.—Should have knowledge of all chemicals and other reproduction stores and equipment in common use, and their nomenclature and should be able correctly to identify them.

Should be capable of preparing indents and arrange for receipt issue and accounting.

Should possess knowledge of the methods and precautionary measures required to prevent deterioration of reproduction stores and paper. Should know the correct procedure for storage of inflamable articles and the method of handling them. Should possess a thorough knowledge of all tables of weights and measures used in reproduction work and of all normal sizes of paper glass negatives and zinc plates.

Should maintain the consolidated lists of plant and machinery furniture, instruments and petty stores books, etc., in use in the press and furnish the periodical returns. Should be able to prepare the various solutions, chemical compounds, etc., according to the given formulae. Should be able to forecast the requirements of chemicals paper, inks, stores, etc., and furnish the information when required for procurement.

Press Store-keeper—Reproduction Personnel Grade II.—
1. Maintain issue and account for paper issued for various jobs.

2. Season paper for colour printing.

3. Receive, account and issue one side sheets and stationery articles.

4. Possess knowledge of the suitability of the different types of paper for various printing jobs.

5. Should know how to store paper guarding against white ants, bad effects of atmospheric changes ; etc.

Press Store-keeper—Reproduction Personnel Grade III.—1. Issue of chemicals, inks, stores, litho articles, etc. daily on requisition slips.

2. Maintenance of receipt, issue and balance ledger of chemicals, solutions, inks, litho articles and other stores, etc.

Press Store-keeper—Reproduction Assistant.—Assist the press Store-keeper in preparing solutions and chemical compounds. (ii) Issue of chemicals, Ink, Stores and Litho articles daily to sections for work. (iii) Listing out articles to be condemned. (iv) Collecting and listing out articles to be sent to general stores.

Press Store-keeper—Technical Labourer.—Carrying of chemicals from General Stores, carrying of paper (reams) from General stores and from place to place in the press. Assisting in seasoning paper. Sorting out papers of broken bundles. Cleaning and arranging things in the press stores. Cleaning receptacles, bottles, measure glasses, etc., used in preparing of solutions.

Map Mounters—Reproduction Personnel Grade I—Technical Clerk.—To be the clerk in-charge of the map mounting section. Receive and register work, prepare R.S. and issue work for execution. Prepare R.S. cost. Maintain all registers, stock books, diaries, etc., kept for providing materials for various reports and initial them. Prepare indent for store cloth, etc. Stock issue and account for map mounting materials, chemicals, cloth and other articles of stationery used in the mounting section.

Arrange for supply of mounted copies in time. Maintenance of the list of plant and machinery, furniture. Petty plants, instruments, stores articles, books, etc. in the section and sending returns. Although he is working as T.C. in the map mounting section he will be part of Technical Office taking his chance of upgrading in group D. Technical Office.

Map Mounters—R.P. Grade II.—Folding copies mounted flat on cloth-segmenting of maps—Mounting of maps in Bridges other special styles—Gelatine sizing and varnishing of map, etc.

R. P. Grade III.—Mounting maps flat and in sections on cloth, sheet joining maps containing minute details—Edging of mounted maps providing wooden rollers to wall maps—Handle nipping press —Folding paper copies, etc.

Reproduction Assistants.—Oiling and greasing Mill Board cutting machine, Nipping press, preparing paste, applying prepared paste to the reverse side of the maps and segmented bits—washing vessels.

Preparing paste to the required consistency—Diluting varnish to the required consistency—feather edge—stripping—sheet joining of maps having not much density of details—Handle mill board cutting machine and guillotine.

Extract of G.O. Ms. 975 (Revenue Department), dated 9th May 1968.

"The duties are drawn upon the following premises:—

The duties are not to be taken as exhaustive but are in indication of the duties to be performed. So the holders of the posts can not and should not decline to do work connected with or incidental to those indicated. The authorities have also right to ask any person to do any work at any time in the interests of Public Service".

CHAPTER XXIV.

SURVEY INSTRUMENTS.

The following are the instruments generally used in Cadastral Survey in the Tamil Nadu.

In Field

1. Chain
2. Cross-Staff
3. Offset Pole
4. Theodolite
5. Circumferenter
6. Prismatic compass
7. Plane Table.

In Office

1. Plotting compasses
2. Proportional compasses
3. Beam compass
4. Bow compasses
5. Drawing pen
6. Parallel rule
7. Scales
8. Protractor
9. Pantagraph
10. Computing Scale
11. Area square.

This chapter deals with the description and use of these instruments.

CHAIN.

1. The chain is used for measuring distances required in a survey. There are two kinds of this instrument, one the 20 Metres chain and the other 30 Metres chain.

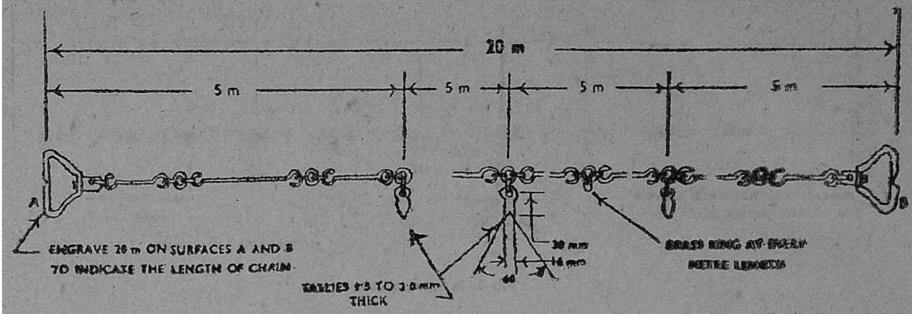


FIG. 1. 20-METRE CHAIN

2. 20 *Metre chain.*—This comprises of 100 links, each, 20 centimetres in length. The brass handle at each is included in the length of the last link at either end. In the middle of the chain, i.e., at the 10th metre from either end, there is a brass index tally with two prongs and at the 5th metre from each end, there is tally with one prong. A tally with a single prong will thus read 5 or 15 metres according to the left or right end of the chain from which the measurement is taken. A distinguishing brass ring is suspended at every metre length, except where tallies are attached. Please see Figure 1 for a 20 metre chain.

(ii). 30 Metre chain:

The following are the three differences in the construction of this chain:

(a) It comprises of 150 links.

(b) In the middle of the chain, there is brass tally with three prongs denoting 15 metres.

(c) At the 25th link from each end, there are indices with a single prong to denote 5 or 25 metres and at the 50th link from each end, there are indices with 2 prongs to mark 10 and 20 metres, according to the end from which the measurement is taken.

3. Each chain is provided with ten iron pins, called "arrows" by which to mark on the ground each chain's length as it is measured. The arrows are made of the same wire as the chain. They are about 30 or 40 centimetres long and are pointed at one end so as to be easily driven in to the ground, and turned at the other end so as to form a ring to serve as a handle.

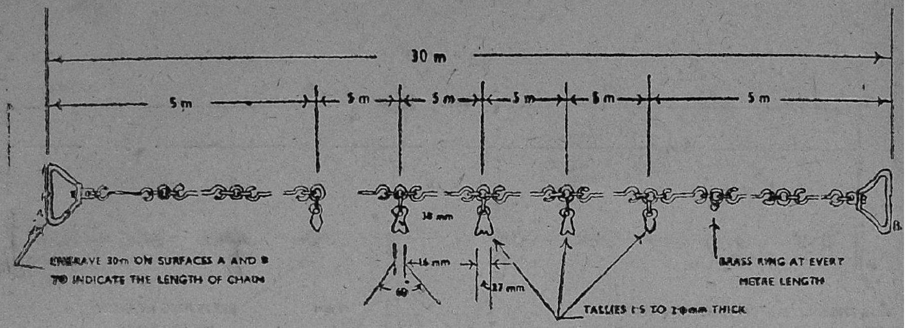


FIG. 2. 30-METRE CHAIN

4. In the early stages of the initial cadastral Survey of the State the feet chain was used during the theodolite survey of village and division boundaries. The thirty metres chain is now used only for rechaining of village and main circuit boundaries. (The 20 metres chain is similar in construction to 30 metres chain but each link is 20 centimetres long.)

5. Twenty metres chain is to be used for all surveys and the measurements recorded to the accuracy of 2 metres in Cadastral Surveys and 1 metre in Town and Street Surveys.

6. As the chain is liable to stretch by use, it is of great importance that it should be tested daily.

7. The best way of testing a chain is to compare it with a standard chain, if there be one at hand. If this is not available with each surveyor, as generally the case, the testing is done with the help of two wooden or bamboo stands, each (2 metres) long with links correctly marked on them. The standard rods should under no circumstances, be used in the place of the offset pole described hereafter.

8. To test the chain, stretch it pretty tightly on a level piece of ground and fix two strong wooden pegs at each end in the handle of the chain. Commencing from the outer edge of the handle at one end, lay down carefully the two standard rods, the ends touching each other; then, keeping the second rod stationary, take up the first and place it beyond the second, touching it by not moving it; next, keeping that stationary, take up and place the second beyond it, and so on until the end of the chain (or distance of 10 rods or 15 rods as the case may be) is reached. The total distance thus measured is the correct length of the chain.

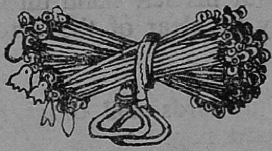
9. This process will, where the chain, is incorrect necessitate the removal of the peg at the other end of the chain to mark the correct chain's length. Smaller pegs should also, at the same time, be driven at every 10th link to denote the correct position of the index marks. This precaution saves the delay that would otherwise result, if the whole process were to be repeated daily.

10. The error in the chain is then rectified by removal or insertion of rings wherever necessary, so that the ends of the standard rods always coincide with the centres of the index marks as denoted by the aforesaid smaller pegs and with the outer ends of the handles at the two ends of the chain.

11. Before commencing his daily operation, the surveyor should stretch out his chain between the stout pegs and see that the handles and index marks correspond with the pegs.

The Surveyor should also occasionally verify with the standard rods the correct position of the pegs.

13. .To fold the chain, take the middle of it in the left hand and with the right hand take hold of the doubled chain just beyond the second link ; double up the two links between your hands and continue to fold up two double links at a time, laying each pair obliquely across the other, so that when it is all folded up the handles will be on the outside easy to tie up and to carry.



14. To unfold the chain, place it at about half a chain's length from the point from which the measurement is to start and at an angle of 45 degrees to the line to be measured ; take the two handles in the hand, and walk away from the chain as it lies on the ground. The two chainmen should then take one handle each and move to his position.

15. Flags are first to be set up at the points the distances between which is to be measured. The flags used in the Tamil Nadu Survey are made of bamboo forming staves each about two metres long with flags made partly of white and partly of coloured cloth hung on the top are to be generally used.

16. To measure a line, two men, a leader and a driver, are necessary. The rear chainman or driver is responsible for the direction and for the chain being straight. The front chainman or leader acts under the driver's order.

17. The leader grasps in his left hand the handle at one end of the chain and the 10 arrows with their points turned outward and proceeds in the direction of the line to be measured, while the driver remains at the starting point with the other end of the chain.

18. The driver then, by motion of his hand puts the leader in an exact line with the forward flag and first shaking the chain, so as to get any knots or bends out of it, calls out down, and holds both his hands on the ground, both hands having hold of the handles of the chain, the handle touching the starting point.

19. The leader when "down" has been called, adjusts the chain to make it quite straight and putting both his hands on the ground gives a steady pull on the chain and then, freeing his right hand, draws one of the arrows out of the left hand and sticks it in the ground close to the handle of the chain. If the ground is hard he makes a cross on the ground in the place he attempted to drive in the arrow, and lays the arrow across the mark.

20. When the arrow has been put in firmly or when a mark has been made, the leader rises, turns round, makes one step to the left of the direction in which he is going, and with his left hand throws the chain to the driver's left, so that it may be clear of the arrow when it is dragged to the front.

21. The leader then turns his left hand upwards and drags the chain steadily to the front towards the forward flag.

22. The driver rises when the leader rises and follows just fast enough to keep the chain a little loose and to prevent unnecessary drag on the hand of the leader. He should keep a sharp look-out on the chain and stop the leader if the chain gets entangled in anything. If the chain should be entangled, he steps forward and clears it ; directly it is clear, the driver calls "forward", and the leader moves on as before.

23. When the driver arrives within a pace of the arrow left by the leader, he calls out sharply "halt", on which the leader turns round and faces the driver directly, and if he is out of the line moves so as to be in a line with the driver and the back flag. The driver motions with his hand any correction in the position of the leader that may be necessary, shakes the chain and calls out "down", as before.

24. The same process as before is gone through by the leader.

25. On the leader rising, the driver, holding the chain in his left hand, pulls up the arrow with his right, and places it in his left hand with the point turned out.

26. When all the arrows in the leader's hand have been exhausted, the driver carries those in his hand to the leader and counts them over audibly before delivering them to him. Every change of arrows should be noted by the surveyor.

27. On the leader arriving at the closing point, he invariably pulls the chain past that point till the driver calls " halt ".

28. Neither of the chainmen should leave his position to come to the closing point.

29. The surveyor sees how many arrows the driver has, and counts them himself. The surveyor then sees how many arrows the leader has and counts them himself. The two numbers so counted should total ten.

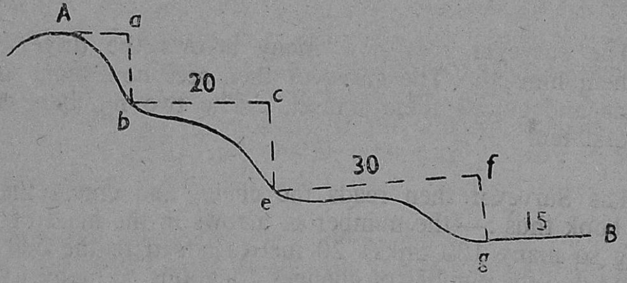
30. The Surveyor then reads the chain, and enters the result in his field book thus :—the number of arrows in the hand of the driver (denoting so many 100 links) 20 metres added to the odd links on the ground and the number of changes (denoting so many 1,000 links) 20 metres will make up the entire length of the line between the two points. Care should be taken that 70 is not read as 30 and 60 as 40, as the index marks are the same for both.

31. The Surveyor should keep a continual watch over the chainmen while measuring lines. To do this, his position must be just in rear of the chain but, occasionally, when chaining a long line, he should change his place to the front of the chain and see that the chain has not got out of the direct line.

32. When chaining boundaries with offsets, the leader must not move from his position till the Surveyor orders " forward ".

33. As the driver is the more responsible person of the two men, the more intelligent of them should be put on to do this duty. If inexperienced chainmen have to be employed, the surveyor would do well to get them measure the distance between any two points, and then remeasure it in the opposite direction. The difference of the two results ought to impress upon them the necessity for great care in chaining.

34. It often happens that a surveyor has to conduct his measurement up or down hill slopes or on land with marked undulation. Since it is only horizontal distances that are required for cadastral surveys, and not the actual distances measured along the surface, the method of chaining described above is not wholly applicable. The chaining up and down the slopes is accomplished with sufficient accuracy, for all practical purposes, by what is known as "stepping" or breaking the chain. This consists of short lengths of the chain say 10 (2 metres) or 20 (4 metres) links, being held in a horizontal position and the extremity transmitted to the ground by dropping thereon an arrow (with the ring downwards) from the end of the chain or that part of it held by the leader. The point where the arrow strikes the ground should be marked in order to hold the chain there for the next step.



The distance from A to B will be $Aa + bc + ef + g\mathrm{B} = 7 + 20$ $30 + 15 = 72$ links. (14 metres)

35. For the proper measurement of long chain lines, especially over undulating ground, flags should be set up at as many intermediate points on the lines as may be deemed necessary. This is called "ranging" and is done as explained below.

36. When the flags at the two stations the distance between which is required to be measured are not visible one from the other, the surveyor should select a convenient place, if possible about midway between the two stations, from which both the flags can be seen. He should make one of his chainmen stand in the direction of one of the flags and at a distance of about one chain from the position which he himself occupies. Standing still in his place, the chainman should direct the surveyor to move either to the left or right until the latter comes in a line with the other flag.

The surveyor will find that the chainman is no longer in a line with himself and the first flag. He should motion the chainman to move either to the left or right until he is placed in the line. If the chainman should in his altered position, find that the surveyor is standing in a line with himself and the other flag, they will both be in the line between the two flags. If not, the above operation should be repeated until they come to be in a line.

At the positions occupied by the surveyor and the chainman, two flags should be set up.

As many more flags as may be necessary should then be set up in the direction of the two stations.

37. The direction of the line can also be determined by the aid of the cross-staff thus :—

Place the cross-staff at a point approximately in a line between the two stations. Sight one of the stations through one of the grooves of the cross-staff. If the other station is also sighted by the same groove from the opposite end, the cross-staff will mark the position of a point in a line between the two stations. If not, the cross-staff should be moved laterally until both the stations are visible through the same groove. A flag should be set up at this position of the cross-staff and the other intermediate flags set up at convenient intervals in the direction of the two stations.

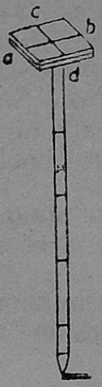
38. When either or both of the flags at the two stations become invisible after some part of the distance has been measured, the following method should be adopted :—

As soon as the surveyor notices that either the forward or back flag is beginning to become invisible, he should set up flags at some distance in front of the leader or behind the driver according as it is the forward or back flag that is getting invisible. He should continue to set up flags thus, as often as may be necessary.

CROSS STAFF.

1. When the boundary of a survey has bends in it, as is generally the case, the best method of fixing the bends is to run long straight lines from one principal bend to another and, when opposite to each bend, to measure the perpendicular distance termed the "offset", from the bend to the chain line. The point at which the perpendicular from the bend meets the chain line is determined by the cross-staff.

2. The cross-staff consists of a block of wood, about (4 inches) 10 Centimetres square and (2 inches) 5 Centimetres in thickness, fixed on the end of a staff, (5 feet) 1·5 metres long, with an iron spike at its other end, for the convenience of planting it firmly in the ground. The square piece on the top, called the head, has two grooves, *ab* and *cd* in it about half an inch (12.7 Millimetres) deep, at right angles to and cutting each other in the centre.



3. The cross-staff being placed at any point on the chain line, if one groove be directed to the forward or back station, the other will give the direction of the perpendicular to the chain line at that point.

4. To test the accuracy of the cross staff, set it firmly on the ground, noting two well-defined objects, one through each groove. Then turn the head of the cross-staff a quarter round so that the two grooves change places. If the said two objects still appear intersected through the grooves now directed towards them, the cross-staff is correct and not otherwise.

5. Incorrect cross-staves cannot be rectified and should be rejected.

OFFSET POLE.

1. The offset pole is a straight bamboo, generally 2 metres (10 links) long with notches cut on it to mark the links and with iron ferrules at both ends.

2. It is used to measure offsets, i.e., perpendiculars to the chain line from bends on a boundary.

3. The distance between the bend and the point on the chain line is measured by one man by laying the offest pole flat on the ground with one end touching the starting point and the other end pointing directly to the closing point. Having thus measured the distance of one offset pole, the man raises the end of the pole at the point from which the measurement starts keeping the forward end on the ground; and turning the pole over again lays it on the ground in the required direction, so as to measure a second distance of an offset pole in length.

4. This process is repeated by the man until the whole distance has been measured. Each time that he causes the pole to revolve, he should call out the number of offset poles measured by him.

5. Care must be taken that the offset man lays the pole horizontally on the ground each time. It will be found that, in order to avoid stooping and to be able to measure more quickly, the offset man will, unless looked after, turn over the pole at some distance from the ground thereby causing the offset measurement to appear longer than it ought to be.

6. For measuring offsets exceeding one chain, the chain should be used and not the offset pole.

THEODOLITE

1. The theodolite is the most important and valuable instrument in the hands of a surveyor. By it is determined the horizontal angle subtended by any two objects at the point of observation and also the angle of elevation or depression of an object situated above or below the station of observation.

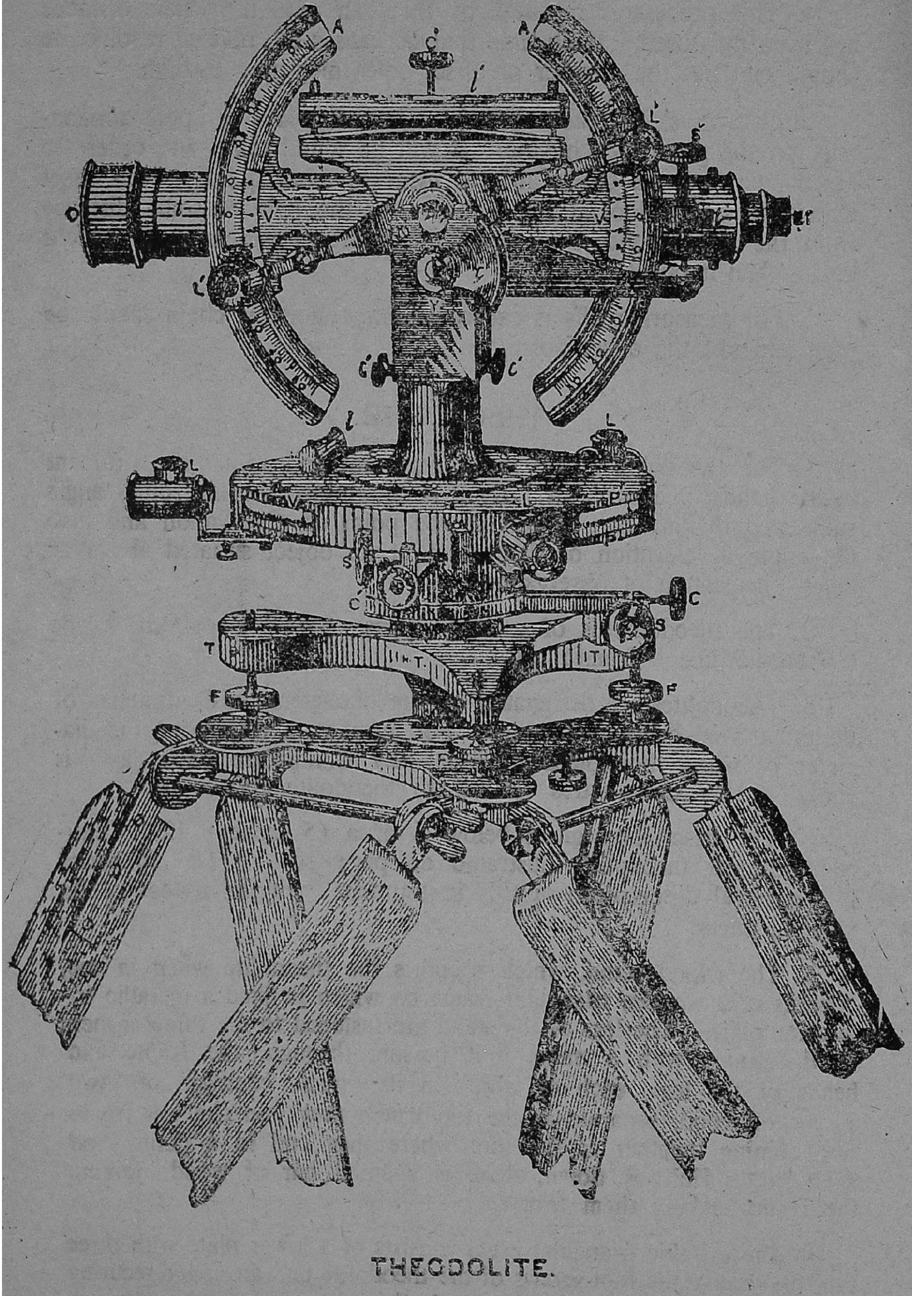
2. The theodolite is of various types, e.g., "Y pattern", the "Everest", the "Transit", etc.

3. Theodolites are designated by the diameters, in Centimetres of their engraved horizontal circles. For instance, a theodolite, the diameter of whose horizontal circle is 12.7 Centimetre (5 inches) is called a 12.7 Centimetres (5 inches) theodolite and so on.

4. The description given below is of a (5 inches) 12.7 Centietres Everest theodolite illustrated on page 184. The following is a general description of this instrument with the names of its various parts.

5. The tripod stand, which supports the theodolite when in use, consists of a wooden triangular frame on which is fixed a metallic triangular plate. The legs of the stand are fastened to the three corners of the frame with a metal bolt passing through the frame and heads of the legs, each of which in its turn consists of two pieces of wood, separate at the top where they join the top frame and coming together at the foot where they end in a point shod with iron. Halfway down, there is a small bar of wood joining them and making them firm.

6. The metallic triangular plate consists of a lower plate with three cups to receive the foot-screws of the theodolite and an upper securing plate with three holes in it to lock the foot-screws either by a spring arrangement or by the tripod clamping screw.



THEODOLITE.

7. The theodolite may be described as consisting of two main parts, the lower and the upper.

8. Lower part—The lower part begins with three foot-screws F.F.F. (*See* diagram on opposite page) which are provided for supporting and levelling the instrument and work into the three arms of a tribrach T. T. T.

9. The boss of the tribrach is pierced to allow the vertical or azimuthal axis to work in it, and has attached to it two arms, one carrying the lower horizontal clamp C and the lower horizontal tangent or slow motion screw S, and the other, the upper horizontal clamp C and the upper horizontal tangent screw S'.

10. Then comes the horizontal plate P, having graduations marked on a silver circle called the horizontal limb.

11. Over this fits a thin circular plate P' carrying three silver graduated horizontal verniers (shown as V in the diagram and marked A, B, C on the instrument), and three movable horizontal lenses, L.L.L. above them for reading the graduations.

12. Above the vernier plate is fixed the horizontal level 1 (by means of two capstan-headed or drawing screws).

13. At the upper end of the vertical axis is a horizontal bar from whose ends spring up two low supports called the Y's to which are attached the cleats C.

14. Upper part—The upper part begins with the transit or horizontal axis which terminates in two truly ground cylindrical pivots.

15. The pivots rest on the Y's and are locked in position by the two cleats.

16. Midway between the pivots, and at right angles to the horizontal axis lies the telescope tt, carrying with it two arcs A, A, of the vertical circle or limb.

17. To the horizontal axis is also attached an arm carrying at its ends two vertical verniers V^1 . V^1 On the arm is fixed the vertical level 1^1 The whole is fixed in position by means of two screws C^1, C^1 called clips which work in oppositte directions against a shoulder between them.

18. Like the horizontal limb and horizontal verniers the vertical arcs and the vertical vernier are of silver and graduated, and read by means of two vertical lenses L', L'

19. There is also another arm on the horizontal axis, carrying the vertical clamp C'' and the vertical tangent screw S''.

20. In the telescope are the eye-piece E, the object-glass O with its cap, as also a mill-headed screw which carrying a pinion and working in a rack attached to the sliding tube of the telescope, affords the means of nice adjustment for focus.

21. To the upper part of the telescope is attached a compass box when magnetic bearings are to be taken.

22. At the eye end of the telescope immediately in front of the eye-piece, is a diaphragm which is held in its place and adjusted by two capstan-headed screws called collimating screws.

23. To the diaphragm are attached the cross wires which are either fine spider's webs fastened on with varnish or fine lines scribed on a glass disc.

24. *Face*—A theodolite is said to be " face left " or " face right ", when the vertical arcs are to the left or right of the observer standing at the eye end of the telescope.

25. *Box.*—The theodolite fits into a box in which are generally placed the following accessories :—

Magnetic compass.

Spare eye-piece.

Two screw-drivers.

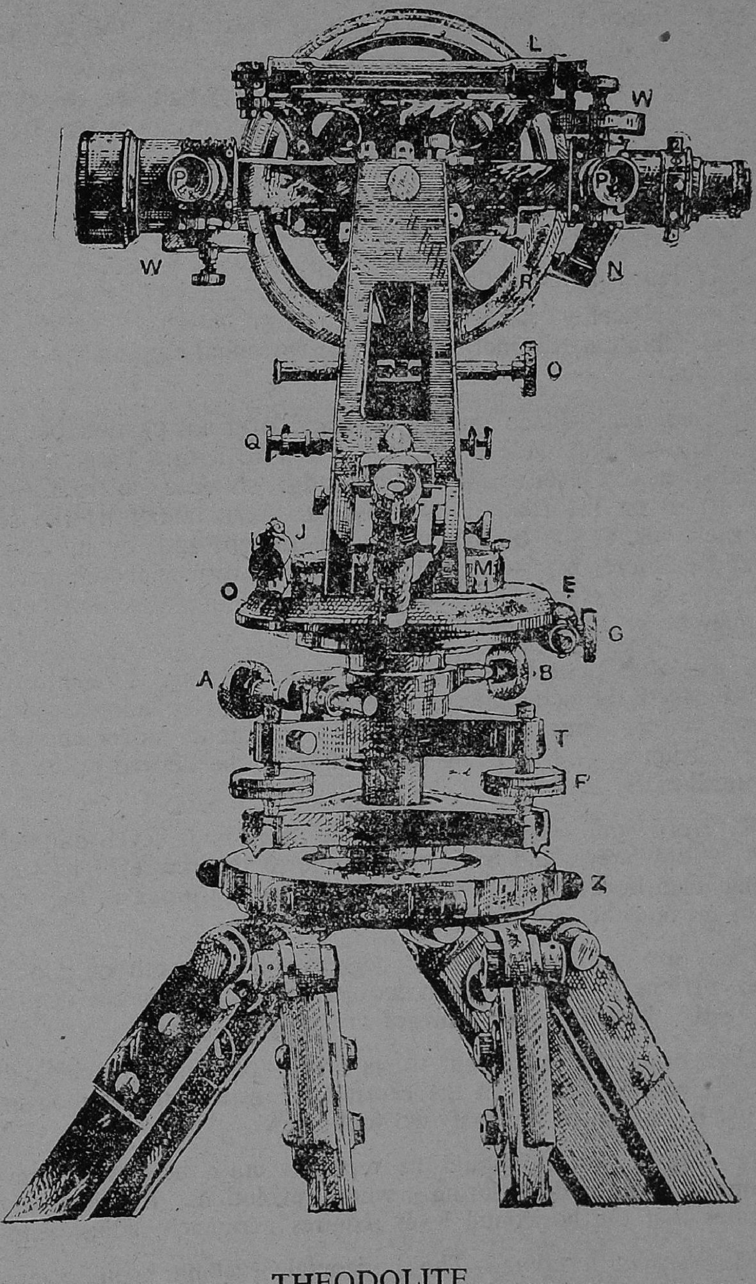
Two pins.

One brush.

Two dark glasses.

Plummet.

26. *Transit theodolite.*—The difference between the Everest theodolite and the transit theodolite is that, in the latter, the telescope can be rotated vertically end for end, the vertical circle is complete and is graduated throughout its circumference and both the horizontal limb and the vertical circle are graduated to a greater degree of minuteness. The transit theodolite is largely used in the Tamil Nadu Survey and Land Records Department in taking observations to the sun for obtaining the true bearings of lines. The illustration facing this page is of a 5 inch (13 cm) micrometer transit theodolite. The micrometers are more quickly read than the verniers especially in a bad light, besides giving closer readings. It should not, however, be entrusted to an unskilled observer. Instructions for reading and adjusting the micrometer are given in rules 44, 45 and 46 below.



THEODOLITE

27. The adjustments of the theodolite are of two kinds :—

(*a*) Temporary, which are necessary every time the instrument is set up for use ; and

(*b*) Permanent, which are only needed when the instrument has newly come into the hands of the Surveyor, or when he has reason to suspect the displacement of the adjustments.

28. The temporary adjustments of the theodolite are—

(1) Centering ;

(2) Horizontal levelling ;

(3) Vertical levelling ;

(4) Obtaining distinct vision of the wires and eliminating parallax or focussing.

29. *Centering*.—Place the tripod stand over the station of observation, with its legs wide apart, so as to give a firm base, and with its head as nearly level as the eye can judge, so as to avoid bringing undue strain on the foot-screws ; suspend the plummet by the string from the hook at the bottom of the instrument and, by moving the legs of the stand, bring the plummet exactly over the plummet hole on the top of the station, observing at the same time that the theodolite continues to be roughly level.

In the latest pattern of theodolite, final centering is facilitated by what is called the self-centering arrangement, which admits of the tribrach system being mounted to allow of lateral movement of the whole instrument and of being clamped when the desired position has been reached.

30. *Horizontal levelling*.—Place the horizontal level parallel to any two foot-screws and bring the bubble to the centre of its run by moving them both either inwards or outwards according as the bubble should move either to the right or to the left.

Then turn the instrument 90 degrees in azimuth or a quarter round. If the bubble is not in the centre, bring it to the centre by moving the third foot-screw inward or outward.

Then bring the instrument to its first position, and if the bubble does not continue to be in the centre, the instrument must again be levelled by means of the first two foot-screws.

The above process should be repeated until the bubble remains stationary in the middle during a whole revolution. If it does not, it indicates that the horizontal level requires permanent adjustment.

31. *Vertical levelling*.—The horizontal levelling being complete, the vertical levelling can be completed by bringing the bubble of the

vertical level approximately into the centre of its run by the clips and then proceeding exactly as described in the preceding rule. If the bubble does not remain steady, in whatever direction the telescope may be pointed, it indicates that the vertical level requires permanent adjustment "*see* also rule 40".

32. *Eliminating parallax and obtaining distinct vision of the wires.*—This adjustment consists in bringing the rays of light from the object-glass and the eye-piece to meet at a common focal point on the diaphragm. If the rays do not come to a point at the diaphragm, then the object observed would appear indistinct, and to change its position in relation to the wires as the eye is moved. To effect this adjustment, turn the millheaded-screw of the eye-piece until the threads of the diaphragm are seen sharply defined against the sky, point the telescope at some well-defined distant object and bring it to the proper focus by the millheaded-screw near the object-glass.

To test the accuracy of this adjustment, intersect the object accurately by using the tangent screws, with the centre of the wires in the diaphragm. Now move the head laterally at the same time watching the intersection of the object with the wires which should remain steady if the adjustment is perfect.

33. The permanent adjustments of the theodolite **are—**

(1) Setting the horizontal level parallel to the horizontal plate to indicate the verticality of vertical axis;

(2) Collimating in azimuth;

(3) To make the vertical and horizontal wires respectively vertical and horizontal;

(4) Setting the vertical level parallel to the Zero of altitude of the vertical arcs, and determination of value of one division of the level scale.

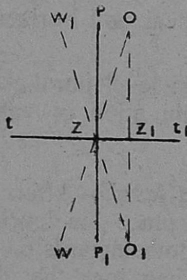
34. *Setting the horizontal level.*—After levelling the instrument as described in rule 30 above, place the level parallel to any two foot-screws and by turning them both inwards or outwards, bring the bubble to the centre of its run. Then turn the upper plate 180 degrees in azimuth, i.e., half round so as to bring the level over the third foot-screw. If the bubble is then in the centre of its run, the level is correct, if not, the bubble must be brought to the centre by correcting half the difference by the same two foot-screws and the remaining half by the capstan-headed or drawing screws at the ends of the level.

Again turn the upper plate 180 degrees in azimuth, i.e., bring it to its first position. If the bubble does not continue to be in the centre, repeat the process as before until the bubble occupies the centre.

Occasionally, turn the upper plate a quarter round, i.e., 90 degrees and adjust the level by the third foot-screw alone.

35. *Adjustment for collimation in azimuth.*—A theodolite is said to be collimated in azimuth, when the line of collimation, i.e., the imaginary straight line joining the intersection of the wires and the optical centre of the object-glass, cuts the transit axis or axis of vertical motion at right angles.

In the figure let tt, represent the transit axis, then when the line of collimation, which for shortness call c, coincides with the perpendicular to tt, or the line p p1, the instrument is in collimation; and if the telescope be made to describe a semi-circle in its Y's, its line of collimation produced will pass through the zenith, describing a great circle. But if C be represented by OW, then the semi-circle traced out will be represented by OO_1, the false zenith being Z_1, while the arc described will be that of a small circle. In other words, by changing face, the object end, or O will arrive at O, while the wires W, will describe a similar small circle and reach W_1. Whence if any object on the horizon give a horizontal reading at face left of a°, and then the pivots of the instrument be changed and the telescope be turned sufficiently in azimuth to intersect the object, the two readings thus obtained will disagree by OW_1. The error in collimation will, therefore be $\frac{OW_1}{2} = OP$



36. The two methods of collimating in azimuth generally in use are :—

(1) By changing pivots : This process would be used for all small theodolites, the telescope of which cannot revolve through a complete vertical circle.

(2) By changing face: Applicable to transit theodolites whose telescopes can revolve through a complete vertical circle.

Collimating by changing pivots.—Throw open the cleats and see that the clip-screws of the index arm are barely biting their shoulder and no more. Intersect the object azimuthally, and note the reading, taking care that the clamps are holding firmly,. Next release the clip screws, raise the telescope gently and revolve the transit axis through 180 degrees so that the level comes underneath, leaving the index arm and clip-screws upwards. Replace the telescope gently with the pivots changed and with the object-glass still pointing towards the object.

If the wires in this second position of the telescope still intersect the object, the instrument is in collimation ; if not, complete the inter-section by the tangent-screw of the upper plate and note the second reading.

Set the instrument to the mean of the two readings, and then, looking into the telescope move the diphragm by its collimating screws until the wires again intersect the object. Repeat the process until the intersection becomes constant or changing pivots, remembering that half the apparent is the real error.

Collimating by changing face.—Intersect and note the reading of any fixed object, change face, intersect and read again. The two readings should differ by exactly 10 per cent. If they do not, the error is corrected as above.

In collimating by changing face, any errors that may exist in the graduation of the limb are involved in the process. In collimating an instrument it is desirable that the object selected for intersection should be at such a distance that the object-glass be set to the focus which will be employed during the subsequent observations, as the line of collimation is liable to be distorted when the focus is altered.

37. *To make the vertical and horizontal wires respectively vertical and horizontal.*—As the correct positions for these wires are cut on the diaphragm by the maker so that the lines cut each other at right angles, it follows that to adjust one wire is to adjust both.

Level the instrument with care, see rule 40, intersect any small well-defined object with the vertical wire. and see if it continues bisected along the wire when the telescope is moved in a vertical plane. If this is not the case, the collimating screws must be slackened sufficiently to allow the diaphragm to be revolved until this condition is secured, when they must be again tightened. It will now be found that the horizontal wire, if properly placed by the maker, will continue to bisect an object on which it has been placed when the instrument is turned in azimuth.

38. *Setting the vertical level parallel to the zero of altitude.*—After having performed the two previous permanent adjustments, bring the bubble of the vertical level into the centre by means of the clip screws, intersect an object and read the vertical angle.

Change face, level the instrument as before, intersect the object and read again the vertical angle.

If there is no difference between the two readings, the vertical level is correct. If there is a difference, take the mean of the reading and set the vertical vernier to that quantity by the vertical tangent screw. The object will now be above or below the intersection of the wires and intersection must be made by means of the clips.

The resultant dislocation of the bubble must be corrected by the capstan-headed screws of the vertical level and the process must be repeated until an identical reading of the vertical angle is obtained on both faces.

Determination of value of one division of the level scale.—By means of the clip-screws move the bubble up to one end of its run, say, towards the object end, so that the object end of the bubble corresponds approximately with the extreme reading of the scale. Intersect with the wire some convenient object for observing. Read and record one end of the bubble, say, the object end and the vertical angle. Now, by means of the clip-screws, bring the bubble back towards the eye and as far as possible, taking care that it is really floating and within the graduations of the scale. Re-intersect the same object as before, and record the vertical angle, and the reading of the object end of the bubble in its new position. The difference between the two readings on the arc brought to seconds, divided by the difference of the two readings of the object end of the bubble gives the value of one division of the level in seconds of arc.

Thus—

		Elevation.	Object end of bubble divisions.
1st observation	.. ..	7° 3′ 28″	18
2nd Do.	.. ..	7° 0′ 00″	6
Difference	..	0° 3′ 28″	12

Value of one division .. $\frac{208}{12} = 17{\cdot}3''$

The operation must be repeated several times to get a good mean value.

The bubble of a level is very susceptible to changes of temperature (cold lengthens and heat contracts it). So care must be taken that it is not exposed to such changes while this operation is being performed. Should there be any change of the bubble altering its length while determining the value of a division on the scale, it will be necessary to read and record both ends of the bubble.

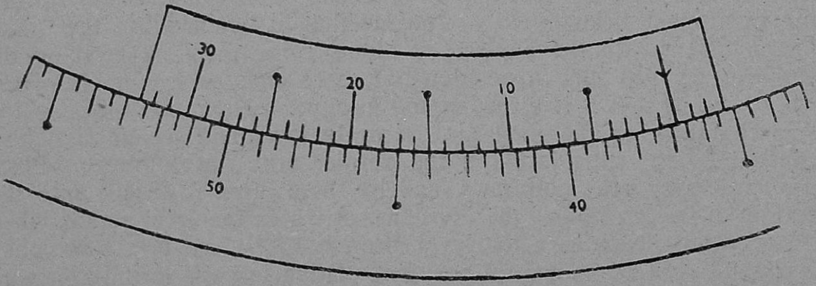
39. *To apply level correction to theodolite vertical angles.*—The readings of both ends of the bubble must be recorded for each observation. To apply the correction the rule is as follows. Divide the difference between the sums of the readings of the object-end (O) and eye-end (E) by the total number of readings, and the result will be the dislevelment in terms of divisions of the scale. Multiply this result by the angular value of one division of the scale, found as above, and the result is the angular correction for dislevelment to be applied to the mean vertical angle. If the readings of the eye-end are in excess, the correction must be subtracted from an elevation and added to a depression. If those of the object-end are in excess, the procedure is reversed.

40. Before observing an azimuth, *see* rule 47 below, it is necessary to level the theodolite with great care. The following method gives better results than that described in rule 30 above, which is however accurate enough for ordinary purposes.

To level the theodolite.—Bring the three levelling screws to about the middle of their run and level the instrument as nearly as possible by the legs. Unclamp the upperplate, place it so that one of the levels is in a line with two foot-screws, and bring it to the middle of its run by these two foot-screws, then bring the other level, at right angles to the first to a central position by turning the third foot-screw. Instead of the second level the first one only, can be used if necessary by levelling it over two screws and then turning the instrument through 90°, and levelling it again with the third screw. Next with the clip-screws alone, bring the long level on the vernier arm into such a position that both ends of it can be seen when the instrument is turned round in any direction. All this, so far, is preparatory to the final and accurate levelling which is now effected by the long level on the vernier arm, as follows :—Place this level over two footscrews, and by these bring it exactly into the middle of its run noting the divisions, at which the level stands when it is central. Next turn the level through 180° and note how many marks it is out of its central position. Bring it back to the centre of its run, half by turning the clip-screws and half by the two foot-screws used before. Now turn the instrument through 90° and bring the level again exactly to the middle of its run by the third foot-screw. Repeat the process if necessary until the instrument is level in any position.

41. *How to read an angle on the horizontal limb.*—The horizontal limb of a theodolite is a complete circle with its circumference divided into 360 equal parts called degrees. Each degree is again divided into two, three or six equal parts, according to the size of the instrument, 5 inches theodolites being generally graduated to half degree and 6 and 7 inch theodolites to one-third and one-sixth degrees. Every tenth degree on the limb is marked by figures, every fifth degree by a dot, every degree by a long line and fractions of a degree by short lines. The 0° or 360° is called the Zero of the limb.

To ascertain the exact measure of an angle to a minute or less on the limb, recourse should be had to the vernier. The length of a vernier in a 5 inch theodolite which reads to half degree is made equal to 29 of the divisions on the horizontal limb and it is divided into 30 equal parts, each part being, therefore, equal to 29|30 half degree i.e., 29 minutes. There is consequently a difference in length of one minute between a division on the limb and a division on the vernier. This difference indicates that an angle can be read off to a minute, although the limb is graduated only to half degrees. If the zero of the vernier, which is marked by an arrow, be moved from the zero of the limb, then the first coincidence that takes place of a division of the vernier with a division on the limb indicates the number of minutes passed over. Suppose the zero of the vernier to be set to any part of the horizontal limb, the degrees and half degrees are first read off. If the arrow coincides exactly with any of the divisions on the limb, the angle will be the degrees and 1|2 degrees reckoned up to that division. If not, look along the vernier plate and see where a division on that plate coincides with a division on the limb. The division on the vernier will indicate the number of minutes to be added to the angle read of on the limb.



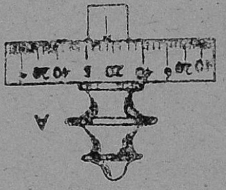
In the above diagram, the arrow of the vernier is between the divisions which indicate the reading to be between 36° 30′ and 37° The sixteenth division on the vernier is coincident with a division on the limb. The angle will therefore be 36° 30′+16′=36° 46′.

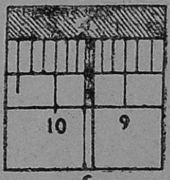
Similarly where the limb is graduated to read 20′, 59″ such divisions are divided into 60 on the vernier to enable 20″ to be read off; or 39 such divisions are divided on the vernier into 40 parts to read off 30″, Generally, if 'a' be arc measure of one division of the limb and the united distance of 'N' such divisions be taken of on the vernier, then one division on the limb, one division on the vernier $= \dfrac{a}{N+1}$ in arc.

42. *How to observe a horizontal angle.*—Having performed the temporary adjustments, intersect the back station, remembering that the circuit being surveyed and should always be to the left of the observer. Record the reading, unclamp the upper plate, intersect the forward station and record the reading. The difference between the two readings will be the angle required. The process must be repeated if the second angle obtained differs from the first by more than the minimum graduation of the theodolite and continued until angles in agreement are secured. *See* Appendix No. XVII.

43. When reading vertical angles adopt that set of numbers increasing from zero on the limb to zero on the vernier.

44. *To read the micrometer of the theodolite.*—After having made contact on an object on the Central Cross wires of the telescope in the usual manner with the tangent screw, look through the microscope of the micrometer and notice the position of the "V" shaped indicator " A " which serves the same purpose as the arrow on a vernier.

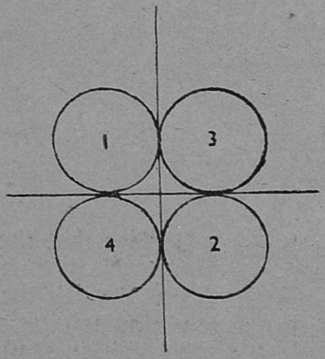




45. In the case shown, it is clear that the reading is somewhere between 9° 30′ and 9° 40′. Next turn the millheaded screw, attached to the micrometer drum 'e' until the two fine wires, 'c' are made to include exactly the ten-minutes division of the arc scale preceding the indicator, 'a' (i.e., the division reading next less than the indicator, a), which in this case would be 9° 30′. Now, read the minutes and seconds on the drum of the micrometer, which added to the 9 °30′, give the reading required. The complete reading in this case would be 9 35' 15″. The micrometer is so arranged that one complete turn of the drum equals 10′ or in passing the wires, 'C' from one ten-minutes mark on the scales to another, the drum is turned exactly once round.

46. *To adjust the micrometer.*—When the "V" shaped indicator, a, is exactly opposite a whole degree or ten-minutes mark, and the wires are made to include this mark, the reading on the drum should be "O". See, if this is the case, and if not, make the drum read O by unclamping the screw, f, which clamps the drum, and turn the drum, being careful to clamp it firmly again after the adjustment has been made. It is perhaps as well for the B micrometer to read a few seconds more than the A. Sometimes the indicators themselves are out of adjustment. To test this, set the indicator of the A micrometer to a whole degree mark on the arc, and then see if that of the B micrometer reads a whole degree or a difference of exactly 180° If it does not, it must be made to by the small screw arranged for the purpose under the micrometer. Before moving this screw it is necessary to slacken the screws fastening the eye-piece and the part of the micrometer carrying the indicator, a, to the rest of the instrument.

47. *How to find the true bearing of a line by observation to the sun.*—The theodolite should be set up over a village trijunction and levelled as directed in rule 40 above. The observation should be confined to a single line at the end of which is the referring object R.O. This R.O. should be about a mile distant. The following is the method. Intersect R.O. left face and read and record horizontal angle on both verniers. Turn telescope to sun, fix dark glass, and place sun in first quadrant of the diaphragm. See illustration.



Take time when the sun's disc is tangential to both wires, read and record, positions of both ends of the bubble of the vertical level and the vertical and horizontal angles on both verniers. Do the same with the sun in second quadrant. Remove dark glass and intersect R.O., again to see there has been no movement of the instrument. Turn telescope to right face, intersect R.O., replace dark glass and repeat observations with sun in third and fourth quadrant,

DISTRICT SURVEY UNIT.

RECORD OF OBSERVATION FOR AZIMUTH OF LINE

Mean time of observation — Magnetic bearing

Object observed : Sun — Forward angle

Approximate Latitude N. — Back angle

Forward distance

Approximate Longitude E. — Back distance

[Value of one division of level, 10″]

Apparent limb or object.	Face.	Vertical angles.								Level.		Watch Times, T.			Horizontal angles (for Azimuth only).																	
		Vernier C.			Vernier D.		Mean of C. & D.			E.	O.				Vernier A.			Vernier B.		Mean of A. & B.			Ang. difference of R.O. and sun.			Mean of pairs (with R.O.)			Mean of faces.		
		°	′	″	′	″	°	′	″			h.	m.	s.	°	′	″	′	″	°	′	″	°	′	″	°	′	″	°	′	″
R.O.	L	—	—	—	—	—	—	—	—	—	—	—	—	—	75	36	30	36	40	75	36	35									
O	L	20	24	00	23	40	20	23	50	9	10	8	01	05	169	41	20	41	50	169	41	35	94	05	00						
O	L	20	23	50	23	40	20	23	45	9	10	8	03	22	169	18	40	19	20	169	19	00				93	53	45			
R.O.	L	—	—	—	—	—	—	—	—	—	—	—	—	—	75	36	30	36	30	75	36	30	93	42	30						
R.O.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	255	36	40	37	00	255	36	50							94	13	26·25
O	R	22	11	40	12	00	22	11	50	8·5	0	8	08	53	350	22	00	22	10	350	22	05	94	45	15						
O	R	22	07	20	07	40	22	07	30	8·5	10·5	8	10	55	349	57	40	58	00	349	57	50				94	33	0·75			
.	R	—	—	—	—	—	—	—	—	—	—	—	—	—	255	36	40	37	00	255	36	50	94	21	00						

remove dark glass and close on R.O. Then read by repetition angles between R.O. and back and forward stations. Record angle observation in the form prescribed.

48. Three sets of observations must be taken. The form below shows how the readings taken during an observation for azimuth should be recorded.

49. The entries in the azimuth observation form should be examined before leaving the ground. An example and the method to be followed is described below:—

Horizontal angles.—The change in azimuth between the two observations taken to the same limb of the sun is (94° 45' 15″)—(94° 05′00″) =40′ 15″ or 40.25'. The corresponding change in time is (8h. 08m 53s)—(8h. 01m. 05s) =7′ 48″ or 7·8′ and the

$$\text{change per minute is } \frac{40{\cdot}25}{7{\cdot}8} = 5{\cdot}16$$

The increase in azimuth corresponding to the increase in time between the two observations of the sun in the same face is then worked out.

The increase in time = (8h.03m.22s)—(8h.01m.05s)=2m. 17s and the corresponding increase in azimuth = 2m 17s × 5′·16″ = 11' 47". The azimuthal are corresponding to the approximate altitude, viz., 20° is 34′ (vide subjoined table) This is to be subtracted from the increase as the forward limb of the sun was first intersected and then the hind limb (94° 05′ 00″ + 11′ 47″)—34′ = 93° 42′ 47″ expected against 93° 42' 30" obtained.

$$\text{Vertical angles—The rate of change per minute is } \frac{22^\circ\ 11'\ 50''}{8h.08m{\cdot}53s}$$

$$\frac{(20^\circ\ 23m\ 50s)}{(8h.\ 01m\ 05s)} = \frac{108'}{7{\cdot}8'} = 13'{\cdot}85.$$

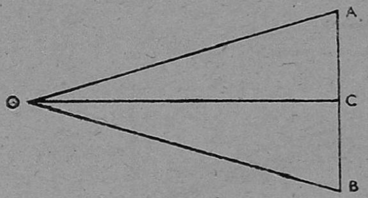
The time between the two observations on face left is (8h 03M 22s) —(8h 01m 05s)=2m 17s. Being a morning observation, the corresponding increase in altitude is 2m. 17s. x 13' .85 = 31' 37" since the upper limb of the sun is first intersected, the mean diameter of the sun, viz., 32' is subtractive from the increase in altitude. The second reading should therefore be (20° 23′ 50″+31′ 37″)—32°= 20° 23' 27" and the actual reading is 20° 23′ 45″.

If a difference of more than 3′ be noticed between the observed and computed angles, horizontal or vertical, the observation is not likely to close and should be rejected.

Table showing the azimuthal arc covered by the sun's disc at different altitudes.

Altitude.	Azimuthal arc.	Altitude.	Azimuthal arc
15°	33′	32½°	38′
17½°	33½	35°	39′
20°	34′	37½°	40′
22½°	34½	38½°	41′
25°	35′	40°	42
27½°	36′	42°	43′
30°	37	43½°	44′
		45°	45′

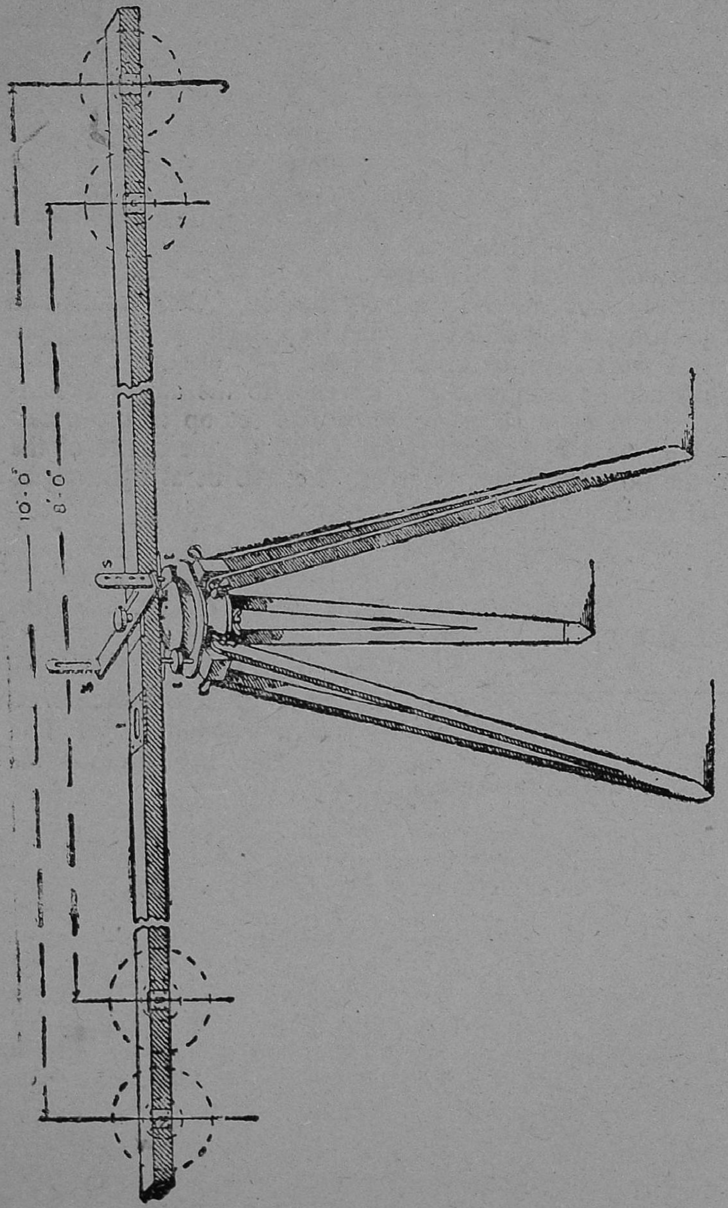
50. *Measurement by using a subtense bar and a theodolite.*—When the ground to be traversed is very broken, better results can be obtained by using a subtense bar than by chaining. The principle of subtense work consists in the fact that the distance between any two points can be computed by reference to the angles subtended at one of them by a short measured line set up at the other. Suppose A—B to be a bar placed horizontally "C" the centre of the bar and "O" the position of the observor. Let AB be at right angles to OC and let AOB = a, and AB = b



$OC = AC \cot AOC = b/2 \cot a/2.$

Hence if AB is known the measurement of AOB is sufficient to determine the horizontal distance of the bar from the observer.

The illustration below shows a subtense bar with two discs adjustable to 8 and 10 feet apart; (2½ metres and 3 metres apart).



SUBTENSE BAR

51. Angles should be read by repetition. Up to 10 chains, with an instrument reading to 20", ten repetitions should suffice, between 10 and 20 chains, twenty repetitions are necessary and beyond 20 chains the results are unreliable. The repetition should be done in the following manner. Set each tangent screw back to the commencement of its run and when intersecting, be careful to turn the screw against the spring. Intersect the disc at the left hand end of the bar, read and record angles on all verniers. Intersect disc at right hand end of bar by means of the upper plate tangent screw and read off and record angle on one vernier to give an approximate value of the subtended angle. This will be useful as a guide against cross error. Next, with the lower plate tangent screw, intersect the left disc, then with upper plate screw, the right disc and repeat the process as often as necessary, keeping count of the number of repetitions, and finishing on the right disc. Finally read and record all the verniers and divide the difference of the means of the first and last readings by the number of reptitions. This gives the value of the subtended angle.

To find a distance divide 2,062,648 by the subtended angles reduced to seconds, when using the 10 foot disc, and 1650,118 when using the 8 foot disc. To find a distance divide 618919 by the subtended angle reduced to seconds when using the (3 metres disc) and 515852 when using the $2\frac{1}{2}$ metres disc).

52. Observations should be recorded as in the specimen form at page 198. When the subtense bar is used only occasionally the remark " Vide S.T. bar observations attached" should be recorded in the traverse field book against each distance computed by the subtense bar.

53. The latitude of a place can be obtained to within a probable error of 10" by observing circummeridian altitudes of the sun. At-least six readings should be taken about the time of transit.

In the figure below the plane of the paper is supposed to coincide with the plane of the meridian.

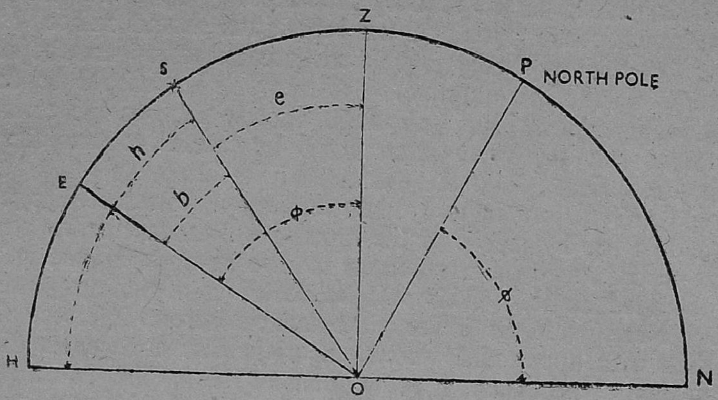
Mean altitude of sun HOS or NOS

Zenith distance=**G** SOZ or SOZ

Declination of sun=$ SOE or SOE

Latitude of Place=Ø=EOZ, viz., **G G** oi G-G,

It is evident that the latitude of a place is equal to the declination of the Zenith EOZ or to the altitude of the pole NOP.



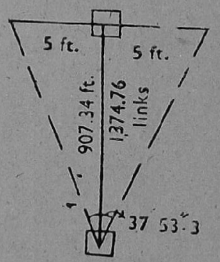
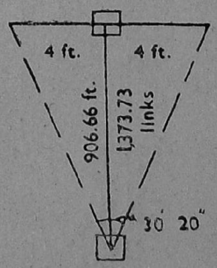
54. In using the theodolite, the following precautions should be observed:—

(1) Never employ force in the manipulation of the instrument. Delicate touch is essential, and the instrument should not strike against the sides of the box.

(2) As soon as the box is opened and before the instrument is taken out of it for use, the surveyor should carefully note the positions of the eye end and object end of the telescope and the face of the instrument and mark with pencil on the side of the box the letters E, O and F corresponding to the eye end, object end and face of the instrument.

(3) When lifting the instrument out of the box, or when replacing it in the box, hold it firmly by the Y's or by the lower horizontal plate.

SUBTENSE-BAR observations as station No. 15 to station No. 14.

Length of the bar.	Group No.	Particulars of readings taken.	Observed angles. Vernier A.	Vernier B.	Vernier C.	Mean of A, B and C.	Difference of zero and the last angle.	No. of repetitions in the group.	Mean of each group.	Mean of the groups.	Distance in feet.	Distance in links.	Diagram with station Nos.
			° ″	″ ″	′ ″	° ″ ″	° ′ ″		° ′ ″	° ″			
10 feet (3 metres).	I	Zero ..	156—52—30	52—50	..	156—52—40	3—09—30	5	0—37—54	0—37—533	907·34	1,374·76	
		First reading.	157—30—10	..	..	..							
		Last reading.	160—02—10	02—10	..	160—02—10							
	II	Zero ..	209—43—50	49—10	..	209—49—00	3—09—20	5	0—37—52				
		Last reading.	212—58—10	58—30	..	212—58—20							
	III	Zero ..	326—45—50	46—00	..	326—45—55	3—09—30	5	0—37—54				
		Last reading.	329—55—20	55—30	..	32 —55—25							
8 feet (2⅜ metres,)	I	Zero ..	60—45—20	45—40	..	66—45—30	2—31—40	5	0—30—20	..	906·66	1,373·73	
		First reading.	61—15—40	..	..	..							
		Last reading.	63—17—00	17—20	..	63—17—10							

Observed and recorded by

Surveyor.

(4) Use the instrument gently, handling it by its substantial parts and seeing that the clamp is loose before you attempt to turn any part.

(5) See that all screws are in the middle of their runs each time the instrument is set up for observation. But when using for the substense bar, the tangent screw should be set back to the commencement of its run.

(6) Be careful not to turn the tangent screw too far or you will damage it. When it has been turned till it has arrived near the end of the space allowed for its play, loosen the clamp and turn the screw back till it is in the centre of its run.

(7) Be careful not to fasten the clamping screws too tight.

(8) Before leaving the station, see that the spring or the clamping screw of the stand is fast and that the levelling screws are equal in height.

(9) The theodolite should be carried by a man and never in a cart.

(10) Always displace the needle of the magnetic compass off its pivot when not actually using it. But when the instrument is put by out of use, the magnetism of the needle is materially preserved by leaving the needle on its pivot and by so placing the box of the instrument that the needle may take its true bearing.

(11) Keep every exposed part of the instrument perfectly dry, and brush off all dust carefully with a feather or camel hair brush, both on commencing and leaving off work.

(12) Oil is not to be applied to any part of the instrument by the surveyor under the idea that it will work easier. A new instrument may perhaps work stiffly at first but a few day's use will rectify that, if oil is necessary, it should be applied by an officer not below the grade of Inspector of Survey and Land Records, who should wipe off the excess oil leaving just sufficient for the purpose of lubrication. An excess of oil only attracts dust, which we out, if it does not do worse damage to the instrument.

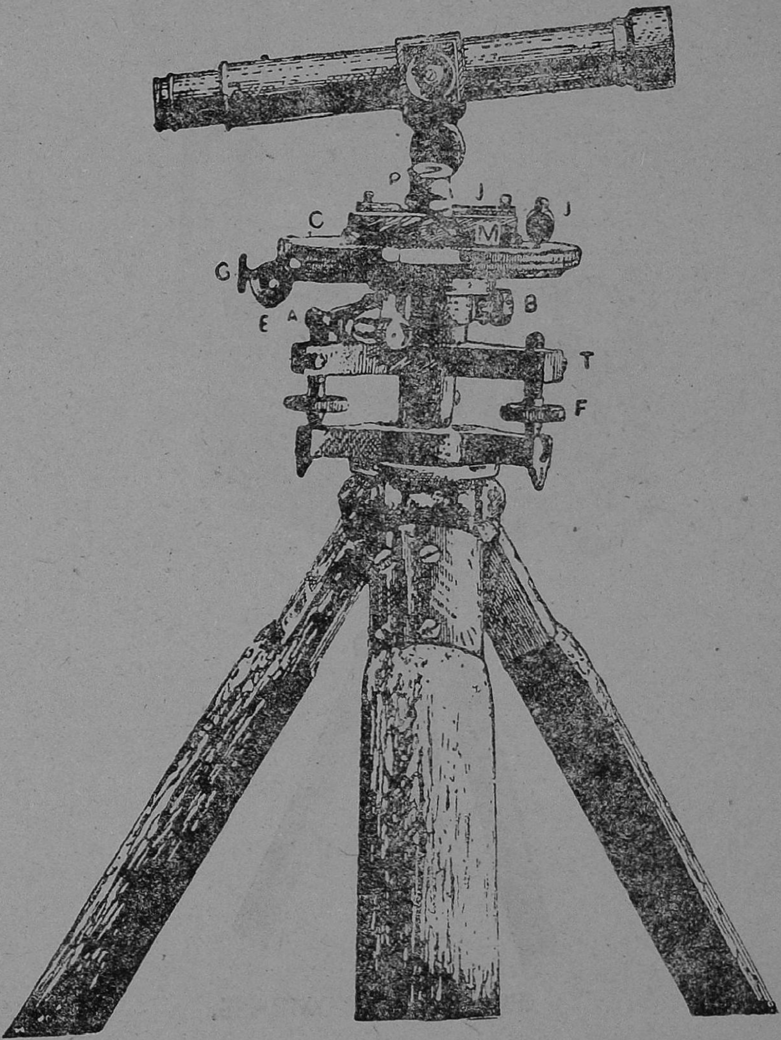
(13) When placing the instrument in the box see that the clamps are free.

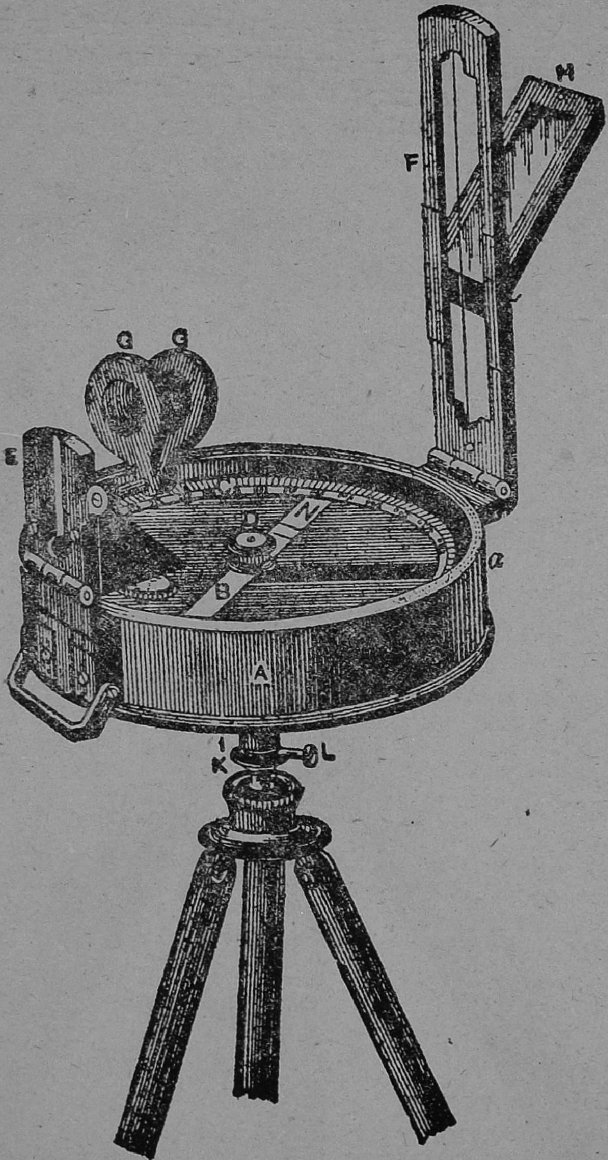
(14) See that the report on theodolite, C.F. Form No. 179, duly filled up, accompanies each instrument when it is received for use or returned after use.

STANLEY'S CIRCUMFERENTER.

Stanley's Circumferenter, an illustration of which is given below, is a light thedolite and screws on to a light tripod stand instead being attached like ordinary theodolites by slots and a clamp.

It is used for the survey of small circuits and has no vertical circle. The adjustments for horizontal levelling is the same as for the theodolite. The telescope is fixed on the vertical axis and cannot be adjusted for collimation.





PRISMATIC COMPASS.

PRISMATIC COMPASS.

1. This is a convenient little instrument invented by Captain Henry Kater, about 1814, for measuring horizontal angles only, or rather for taking the bearings of objects, the angle included between the objects being deduced, if necessary, from the bearings.

2. It is composed of a circular brass box A (*See* diagram on opposite page) containing a magnetic needle B, which carries an aluminium ring C.

3. The needle has a female centre D upon which it is suspended. The centre technically called cap is generally formed of a hard precious stone, agate, chrysolite, ruby or sapphire, the latter being the best. The cap is mounted in a brass or aluminium cell and the needle is supported upon a hardened steel needle point upon which it is perfectly balanced. The north point of the needle is marked by a distinguishing mark or letter N.

4. The upper surface of the ring is graduated to degrees and numbered 10, 20, 30, etc., upto 360. The degrees are generally subdivided to half degrees.

5. A piece of glass fits in the top of the brass box and closes it.

6. On opposite sides of the box are fixed a prism E, that can be raised or lowered at pleasure, and a sightvane F with a horse-hair dividing it vertically in half. The prism is at the south side and the sight-vane at the north side of the needle.

7. The prism is contained in a case which has a vertical sight slit over it which cuts a line with the centre of the top of the prism and with the central hair in the sightvane across the axis of the needle.

8. G, G are dark glasses (on a pivot) of different colours for use in case of a solar observation, or if the glare in front should be too strong for the eyes.

9. The prism is cut to 45° upon one face and 90° for the two others, the 90 faces being worked convex so as to give magnifying power simultaneously with the reflexion of the ring at right angles, so that the reading of the compass appears to stand erect before the observer and to be considerably magnified.

10. Owing to the prism being placed at the reversed or south side of the needle and also because everything seen through it is inverted, the zero of the ring is placed at the south and the numbers of the graduations are printed in the reverse way and also upside down. By this means the number seen through the prism is the reading required.

11. The sight-vane is furnished with a small mirror H on a hinge, which slides up and down the vane, and is used for reflecting objects which are much above or below the horizontal plane of observation.

12. At a, outside the brass box, is a spring which, being pressed by the finger at the time of observation and then released, check the vibrations of the needle and brings it more speedily to rest, thus enabling a reading to be sooner obtained.

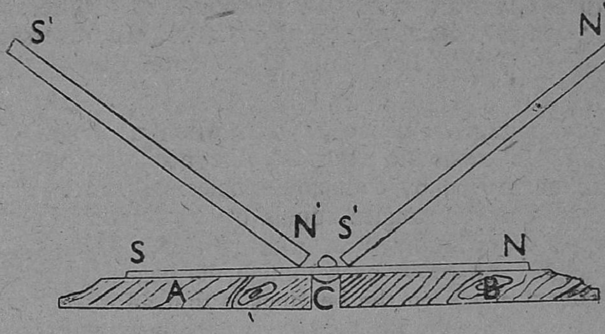
13. A top is likewise fixed under the sight-vane by which the needle is displaced from its pivot, by turning down the sight-vane when the instrument is not in use. This should always be done when carrying the instrument from one point of observation to another; otherwise, the constant play of the needle would wear the point upon which it is balanced. It is upon the fineness of the point that much of the accuracy of the instrument depends.

14. The prism and sight-vane are both on hinges which enable them to be folded down for greater convenience of carriage. When thus folded and a brass cover put on, the instrument fits into a leather case with a strap attached, to be carried over the shoulder.

15. The prismatic compass, though sometimes used in the hand alone, is generally mounted on a tripod stand with a brass head I, with screws into the bottom of the compass box. This brass head also fits into a socket on top of the stand K, loosely enough to allow it to be moved round horizontally, and generally has a screw L by which to clamp or fasten it in some particular position. A brass cap fits on to the top of the stand when not in use and a couple of rings keep the legs of the stand closed when folded.

16. When the needle loses its magnetic quality which it does after a time, it can be remagnetized by using the magnetic bars as explained below :—

The needle is taken out of the compass box and laid on two pieces of wood, A and B, with a space between them to admit the cap C of the needle NS.



The two straight bar magnets N′ S′ are laid upon the needle at an angle of about 30° so as to have the cap of the needle between them without touching each other, and with their north and south poles opposed as shown in the diagram. The magnets are then drawn apart in a horizontal direction along the needle, with constant pressure upon it, so as to reach the opposite ends of the needle simultaneously, and then again pressed back to the centre. After repeating this operation three or four times, the needle is turned over and the process is repeated on the other side, being careful as before to use the same ends of the magnets upon the same ends of the needle. The operation may be repeated several times to be sure of saturation of the needle. It is better to lift the magnets off at the termination of the operation at the centre of the needle.

It is sometimes imagined that compasses require remagnetization whose only fault is dullness of centre. The sharpness of the steel needle point is easily ascertained by sliding the thumb nail over it at an angle of about 30° to it. If the point sticks and holds the nail, it is sharp; if it glides upon it, it is dull. The point may be sharpened by gently rubbing it all round with a slip of oiled arkansas stone. At the same time, the cap should be wiped out with the point of a small sable brush.

17. In using the instrument, it should be placed as nearly as possible over the station and the box made as level as can be by the eye ; otherwise, the ring may not play but may adhere to the side or top of the box. Raise the prism in its socket till the divisions

on the silver ring are visible through the slit. Turn the compass round till the hair of the sight-vane intersects the object to be observed. As soon as the needle is at rest, follow the reflection of the hair downwards till it meets the graduated ring. The division of the latter thus met by the hair is the magnetic bearing of the object looked at from the spot where the instrument stands.

18. The magnetic bearing of the back station, should be observed as well as of the forward one. There should be a difference of just 180° between the two bearings. For instance, the reversed or back bearing of 48° would be 228° and of 228° would be 48°

19. It is commonly believed that when a complete circuit is surveyed with the prismatic compass, the accuracy of the bearings observed can be proved by deducing angles therefrom and seeing whether the total of the angles equals twice as many right angles as the circuit has sides minus four right angles. This is a mistaken belief. The angles will prove even though the bearings may be entirely wrong. The real check on the bearings is that afforded by the reversed or back bearings, or by the plotting of the circuit with the measured distances, or the computation of the latitudes and departures of the circuit with the observed bearing and the measured distances.

20. No great reliance can be placed on work performed with the prismatic compass, as the local attraction of iron in the neighbourhood neutralizes, to a great extent, the polar attraction.

21. There is also an error inherent in this instrument known as the "variation of the compass". The variation of the compass or the needle is the angle which the magnetic north makes with the true north at any point. The direction in which the magnetic needle points is called the magnetic north and differs from the true north by sometimes several degrees east or west of it, the difference depending chiefly upon the geographical position of the country where the needle is set up. At Madras the variation is about east, increasing in higher latitudes and decreasing nearer the Equator.

22. Owing to the defects noticed above, the compass is used only occasionally for surveying minor circuits and laying down topographical details, such as roads, foot paths or streams running through waste land.

23. In the Tamil Nadu Survey, the use of the prismatic compass has been practically given up in recent years its place having been taken by the Stanley's circumferenter.

PLANE TABLE.

1. The plane table is an instrument used for filling in the interior details of a survey, when trigonometrical stations and other points, fixed by a theodolite survey, have been previously projected on the map.

2. It consists of an ordinary drawing board of well seasoned teak or other wood about (an inch) 2½ centimetres thick (30 inches) 75 centimetres long and (24 inches) 60 centimetres, wide with a level surface.

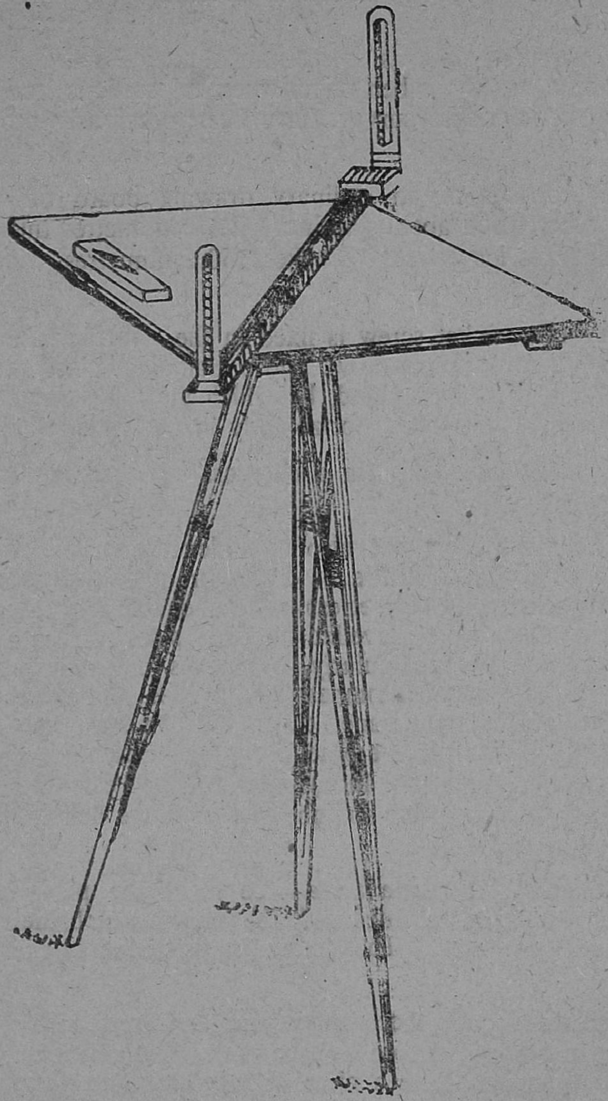
3. A brass socket screw is fixed in the centre of the table, underneath, by three or four screws, and a clamping screw serves to attach the board to the tripod stand, by which the table can at pleasure be clamped tightly or moved horizontally in any required direction.

4. A magnetic needle, in a compass box, serve to point out the direction.

5. The plane table has also an index-rule or alidade about the length of its diagonal, made of ebony or other well-seasoned wood, about $1\frac{1}{2}$ inches (4 centimetres) wide and about (1 centimetre) $\frac{1}{3}$ of an inch thick and bevelled on one side. At each end of the alidade is fixed perpendicularly, by means of screws, a sight-vane like that in the prismatic compass, about 12½ centimetres (5 inches) long. One of the sight vanes called the eye sight vane, is divided lengthwise by a fine slit, the other the object sight-vane by a cut from (a quarter to half an inch) half to one centimetre wide, in the middle of which a fine straight wire or horse hair is fixed lengthwise.

6. *Mounting the plane table.*—To make the plane table ready for use, it should be mounted with the map in which the fixed points have been projected. The mounting is done in the following manner :—

With wet sponge, thoroughly damp the reverse side of a sheet of a drawing paper laid flat on a clean table, then roll it up and put it aside until wanted. Take a piece of long cloth just large enough to overlap the board by about (three inches) 8 centimetres every way and thoroughly wash it to get the dirt and starch out of it. While the cloth is still in the water, sponge the upper surface of the Board and lay on it whilst wet the thinnest paste. The paste should be made of the finest flour available; corn flour is the best. Then stretch the cloth on the board as tight as possible securing the overlap with stiff paste or glue, to the edge and under-surface of the table.



PLANE TABLE.

Rub the cloth well down on to the board. This will cause to adhere slightly, and a certain quantity of the thin paste to ooze up through the interstices of the cloth. Then take the paper, which by this time will be thoroughly damp lay it smoothly on the cloth, press it out from the centre with a dry clean towel and paste the edges down to the cloth with stiff paste. The thin paste which has oozed through will cause the paper to adhere firmly to the cloth, sufficiently to prevent the paper rising but not so much as to prevent its being easily separated when the paper is removed from the Board. Great care must be taken not to rub the upper surface of the paper, as by so doing, its texture is liable to be spoilt and the sizing removed.

Allow the map and board to dry in the shade for two or three days.

To avoid contractions or expansion of the map which is incidental to the process of mounting the plane table should generally be mounted within the blank sheet of drawing paper and the fixed points then projected on it.

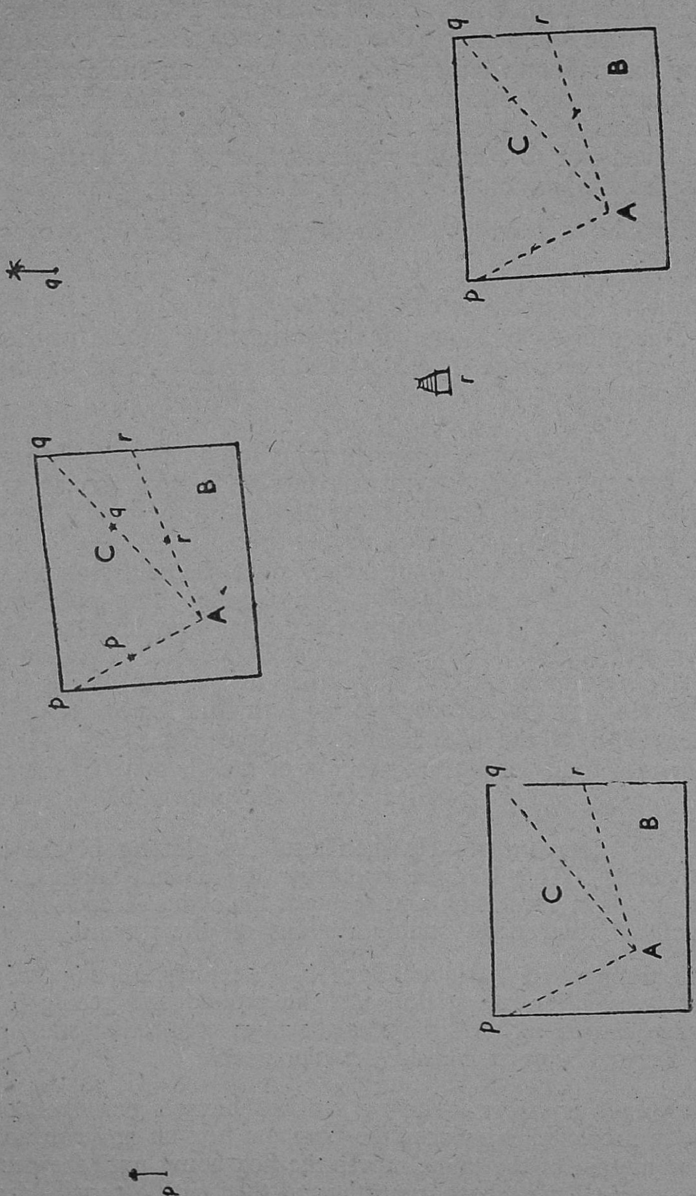
7. *Setting the plane table.*—When using the plane table in field, the surveyor sets up the stand, with the legs wide apart so as to give a firm base, and screws on the table at some fixed point, A, which has been projected on the board, placing that part of the table on which the station is plotted immediately over the said station. This is done by dropping a pebble from the corresponding point on the underside of the table. He then makes the table as level as possible by the eye, and lays the bevelled or fiducial edge of the alidade along the line joining station A and any other distant but clearly visible station B. Holding the alidade firm, he turns the table round until the vertical wire of the alidade intersects the flag at B. He then clamps the table and verifies the position of the alidade and the intersection of the flag. This is called setting the plane table.

8. *Testing the plotting.*—He then tests the plotting of the other projected points. This is done by laying the alidade along A and each other point in succession and seeing if the sights in each instance point exactly to the corresponding stations on the ground.

This testing may also be done by keeping the edge of the alidade at A, sighting the stations on the ground and seeing if the fiducial edge passes through the straight lines connecting station A. with the corresponding points on the plane table.

9. *Fixing the compass.*—Having satisfied himself that the points are correctly projected, he places the compass box on any convenient spot on the margin of the table, moves the box about until the needle points to zero, i.e., the magnetic north, and then with a pencil draws

lines clearly all round the box so that he may on subsequent occasions, be able to replace his compass precisely in the identical position which it now occupies.



Fixing points by intersection

10. *Determining the variation of the compass.*—The Surveyor then removes the compass box from the table and notes the variation, i.e., the angle which the meridional line or any line parallel to it makes with either of the longer sides of the diagram denoting the position of the compass box. The variation should be noted at three or more fixed points projected on the sheet. The mean of the several variations thus ascertained will be the error of the compass. Supposing that the mean variation is ° east, the surveyor, when setting up the table at a point not already fixed, should place the magnetic compass in the position marked for it and turn the table round until the magnetic needle points to 1° east. The table will then be parallel to the true north.

11. *Fixing points by intersection.*—The points selected for intersection should be conspicuous objects which can be easily identified or are likely to assist in the prosecution of the survey. Intersection is done as follows :—

Let A, B and C (see diagram facing the page) be the fixed points and P, Q and R the objects to be fixed by intersection. Having set the table at the station A, apply the fiducial edge of the alidade to the station A on the plan, align the alidade in the direction of the object P on the ground and draw the ray Ap in pencil, from the station A, along the edge of the alidade. Then align the alidade in the direction of the objects q and r and draw the pencil rays Aq and Ar as before.

Remove the table to station B and C and setting it in position, sight the objects p, q and r as before, and draw the pencil rays Bp Bq, Br and Cp, Cq, Cr. The points of intersection of the rays Ap, Bp and Cp, Aq, Bq and Cq and Ar, Br and Cr fix the correct positions on the map of the objects p, q and r. There should be at least three intersections to fix an object and two of them should be almost at right angles to each other.

To facilitate identification of objects intersected, the name of the object should be written along the ray at its end and a small circle drawn on the ray in the approximate position of the object. If the ray be a short one, it should be extended by marking short lengths of it near the edge of the board. These are called *repere* marks and give a good line along which to lay the alidade whenever the plane table has to be set up by such short ray.

12. *Fixing by interpolation.*—The method just described of fixing points by intersection is preferable to any other in as much as—

(1) it has the advantage of requiring a small number of fixed points to work with,

(2) it does not matter how those points are situated with reference to each other, provided the angles of intersection are not less than 60° (the nearer to right angles the better),

(3) there is no accumulation of error, and

(4) the plotting is as accurate as it possibly can be.

But where, as it often happens, the surveyor, on arriving at a station or stations already fixed, finds that the view of the ground he wishes to sketch is obstructed and consequently moves to a more desirable position from which at least three fixed points (projected points if possible), two near and the third distant, are visible, but to which no forward ray has already been taken, he fixes himself by interpolation, otherwise termed fixing by resection from known points. The method of interpolation is described below :—

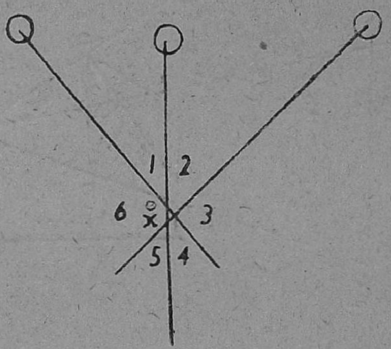
Set up the plane table at the point to be interpolated ; place the compass box in the position drawn for it in the table and turn the table round until the magnetic needle stands at the mean variation already determined. Clamp the table. Place the fiducial edge of the alidade over each of the two near fixed points on the board in turn and in alignment with the flag on each point and from each of them draw back rays. Then draw the back ray from the third, i.e., the distant point. If the compass be a good one and there is no local attraction, your table will in all probability be set correctly in azimuth and the three rays will pass through one point and that point will determine your correct position on the table. But if the rays do not pass through a point, they will form a triangle called the " triangle of error ". The error must be eliminated and the true position determined by the following rules :—

(1) If the three fixed points are around you, i.e., if you are within the triangle formed by the three points, your correct position will be within the triangle of error.

(2) If you are outside the triangle formed by the three fixed points, your correct position will be outside the triangle of error. It will be either to the left or to the right of all the rays when facing the fixed points.

(3) Whether the triangle of error is inside or outside the triangle formed by the three fixed points, your correct position will be distant from each ray exactly in proportion to the distance of the stations appertaining to that ray from your position.

In the diagram given below, which represents a case referred to in rule (2) above, your correct position should be either in sector 3 or 6; but to satisfy rule (3), should be in sector 6;



Estimating this position to be at the point x, lay the fiducial edge of the alidade along x and the most distant of the three fixed points used, intersect the point by turning the table, clamp and draw back rays from the other two fixed points. The three rays should intersect at one point which is then your correct position. If they do not, repeat the operation until they do. Each approximation will of course come nearer and nearer to the truth.

The best position for interpolation is when you are exactly on the straight line between two fixed points or on that line produced.

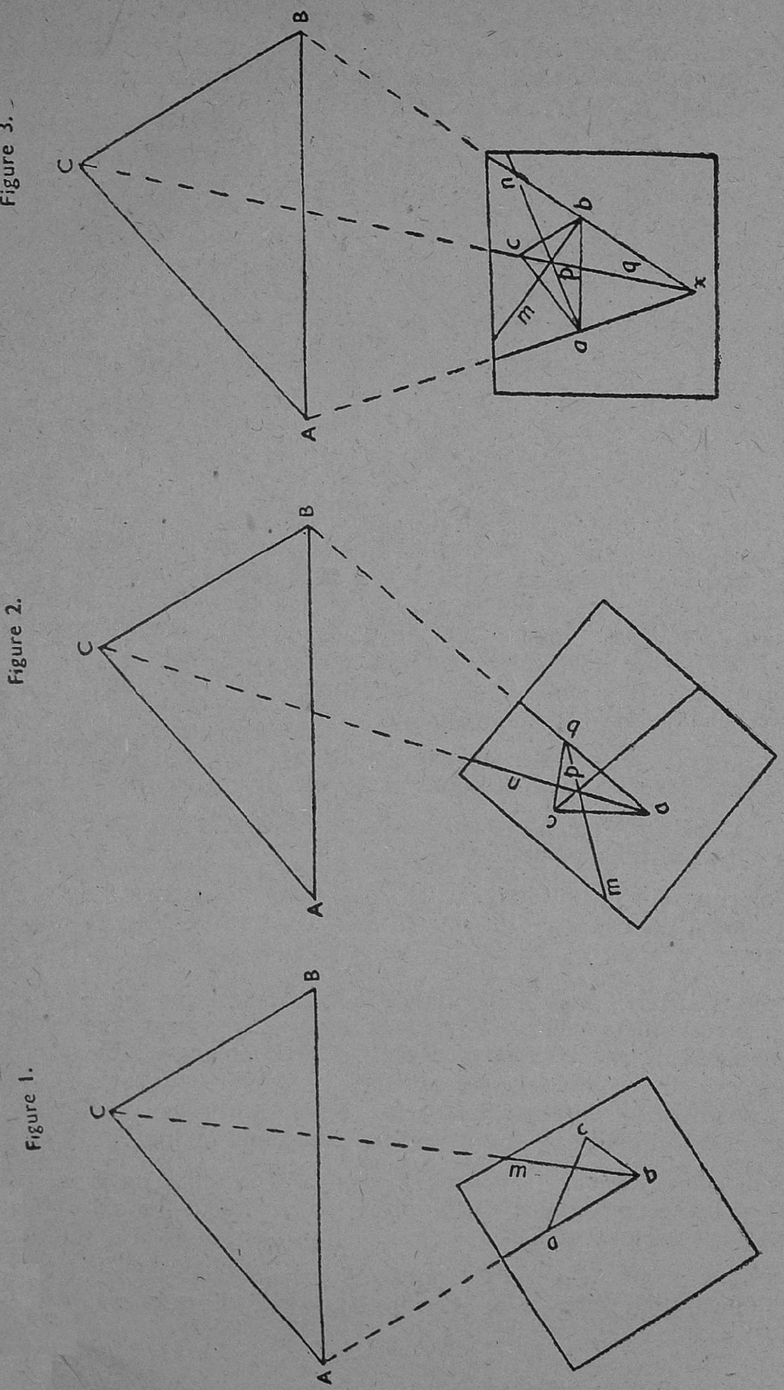
The next best position is when you are within the triangle formed by the three fixed points.

The most unsuitable position is when your position and the three fixed points lie on the circumference of the same circle or very nearly so. No interpolation should be made from a point so situated.

13. It may sometimes happen that only two fixed points are visible from the point of interpolation. When this is the case, since the interpolation has to depend entirely on the magnetic compass, the variation of which is liable to be affected by local magnetic attraction, if any, the interpolated point should only be used for filling in detail and not for obtaining additional fixings.

14. *Fixing points without a magnetic compass.*—The following is the method of fixing the position of the plane table, without the aid of the magnetic compass :—

Select three points A, B and C whose positions are indicated on the plane table by the letter a, b, c respectively (*see* diagram on



Fixing the position of the plane table without the compass.

the opposite page). Having set the table, as explained in rule 7 above, at the point whose position has to be fixed, place the fiducial edge of the alidade at b and along b, a, and turn the table about until the point A is intersected (*vide* figure 1) then clamping the table in this position, turn the alidade and intersect the point C, with the edge of the alidade still against the point b, and draw the line bm; now remove the alidade to the point a, unclamp the table, place the alidade against a and along ab, and turn the table about until the point B is intersected (*vide* figure 2) clamp the table again, and having intersected the point C as before draw the line an; through the intersection p of the lines an and bm draw the line c, p, q passing through the point c, and placing the edge of the alidade against this line, unclamp the table once more, and turn it about until the point C is intersected (*vide* figure 3) now clamp the table and it will be in position. To mark this position on the plan, it is merely necessary to intersect either of the points as A, and draw the line A, ax x will mark the position of the plane table on the plan. The accuracy of the operation is tested by intersecting the other point B and drawing the line Bbx.

This method of fixing points is applicable only to reconnaissance and totally inadmissible for accurate surveying.

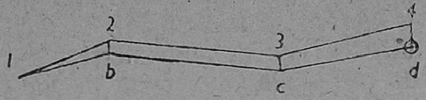
15. *Plane table traversing.*—This should be adopted as a rule only in flat country unprovided with prominent land marks and in valleys and jungles in which plane table fixings cannot be made. The method is as follows :—

Having set up the table at some fixed point and adjusted it with the magnetic compass as explained in rules 7 and 9 above, draw a ray to a flag sent on ahead-the further the better-and measure the distance from the fixed point to the flag. This distance laid off by scale on the ray from the fixed point fixes the position of the flag on the table. While measuring the line, take offsets to all bends and topographical details within easy reach on either side of the line and plot them on the table.

Remove the table to the flag, set it up there and, laying the alidade along the ray previously drawn, turn the table until the starting point is intersected; clamp, draw a ray to the next forward flag from the plotted point measure to that flag, take offsets and plot as before.

Continue the operation until you come to another fixed point, or to a position which can be fixed by interpolation from three fixed points. If this point does not coincide with the last point as fixed by

traverse, as will generally be the case when the traverse is a long one, the error should be adjusted as explained below :—



If 1, 2, 3 and 4 are the stations as fixed by the traverse and the fixed or interpolated point as per this traverse is at 4 and its true position was at d, draw lines through 2 and 3 parallel to 4 d. The length of the parallel from 2 should bear the same proportion to 4 d as the distance from 1 to 2 bears to the distance from 1 to 4; and the length of the parallel from 3 should bear the same proportion to 4 d as the length of the distance from 1 to 2 bears to the distance from 1 to 4. Mark the lengths of these two parallels. The traverse as adjusted will be 1 b, c, d.

In view of such adjustments, the traverse should first be pencilled in lightly and rubbed out when the adjustment has been made.

It will also be found convenient to plot the traverse in the margin of the board and afterwards to transfer it to its proper position when the adjustment has been made.

16. *Filling in the details.*—The principles described above as guiding the surveyor in determining his own, and in laying down the position of other fixed points, also hold good in filling in the topographical features. As soon as the surveyor has set his table at a station and tested some of the other fixed points around him, he should draw rays from his station to all the remarkable points, such as houses, temples, trees, bridges, etc., around him and within a reasonable distance; and estimating the distance assign an approximate position to them and mark them on his table by their respective symbols. He should also draw rays to the junctions and turns of the different water courses and roads in his immediate vicinity and sketch in lightly, by the eye, the ground around him. He should then move off to some distant commanding point, set up his table fix himself, and draw rays to all the remarkable objects to which he drew rays from his first station. The intersection of the new and old rays fix the position of all the objects thus laid down, more or less correctly, according as the angles of intersection are good or bad. The position given by the intersections, if not less than 60 degrees may be assumed to be correct, but when the intersections are sharper, only as approximate. The surveyor then draws rays to such additional physical features in his immediate vicinity as may be visible from his present position and sketches them lightly in pencil. He then works back towards his

starting station, putting up his table at intervals of from (quarter to half a mile) half a kilometre to a kilometre according as the ground is more or less intricate or difficult to see. From each station he draws rays as before and fixes the position of the junctions of the water courses, etc., to which he previously drew, rays, and completes the sketching of that part of the ground. In this way he works back past the first station, always taking rays to remarkable objects and keeping approximate work in advance of his final work. He should never consider any position determined until it has been fixed by at least three rays intersecting nearly at right angles. The surveyor will find it much easier to sketch with the Sun in his front, for if the Sun be behind him, no shadows are thrown on the features he is looking at and all look like one continuous mass. But if he has the Sun in front of him, objects stand out in strong light and shade and it is far easier to pick out or recognize the prominent points.

He will also find it a great advantage to proceed by zig-zag in circuits through the country when the physical formation permits of it. The blank areas thus circumscribed are always filled in much easier and the zig-zag process affords better intersections than can be obtained by working on straight lines.

The amount of detail to be shown will depend upon the scale of the map. On the 1 inch scale (1 m.m. : 5,000 m.m.) it is usual to show all the different areas such as cultivation, jungle, swamps, etc. But on the 4 inch, scale (1 m.m. : 12,000 m.m.) and larger scales, the streets and blocks of houses should be shown. It is, however, a great mistake to attempt to show too much detail, as it only tends to confusion. Again many objects such as roads, wells, temples and similar small objects, which would, if drawn to scale, be represented by almost invisible fine lines or points must be exaggerated on the map, in order that they may draw sufficient attention and receive their true value.

17. In surveying with the plane table, particular attention should be paid to the following instructions :—

(1) As the paper mounted on the board is affected to a large extent by the state of the atmosphere, see that the scale of the map is drawn on the paper. The scale will thus contract or expand with the paper and the measurements will always be correct.

(2) See that the legs of the stand are not shaky and that they rest on firm ground.

(3) See that the clamping screw is tight before beginning work.

(4) In soft ground, see that the legs of the stand are well pressed in.

(5) Always keep the pencil sharp.

(6) Never use a pin as an aid to alignment of the alidade. Place the fiducial edge of the alidade just touching the point from which the ray is to be drawn and in rough alignment with the object to be intersected, keeping alidade in position by placing the second finger of the left hand against the outside edge of the alidade and the first finger and thumb on the top of it. Then stoop and accurately intersect the object as low down as possible on the eye and object sight vanes by a gentle lateral movement of the alidade with both hands. With a little practice, alignment should be made without greatly displacing the fiducial edge of the alidade from the point on the board. Contact and alignment should then be made by a combined forward or backward and lateral movement of the alidade, as in using a parallel rule, so that its altered position may be parallel to its former position. With a little practice alignment should be obtained in this manner in a few seconds.

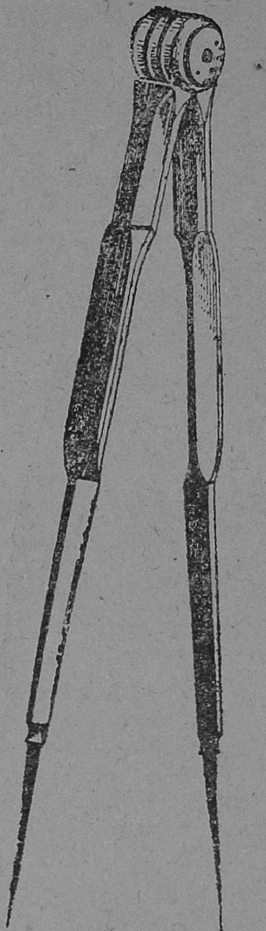
(7) When drawing a ray from a point set the pencil into the point first so as to get the correct angle at which the pencil should be held when drawing the ray along the fiducial edge of the alidade.

(8) On completion of each day's work, the plane table should be covered with water proof cloth which should not be removed except when the table is required for work. Some clean sheets of paper should always accompany the table to keep dirt off the plan.

18. It should be borne in mind that written descriptions of the process of plane tabling, however elaborate, can help the surveyor only in a small way to meet the various contingencies of ground and position that he may meet with and that without a few lessons and a little practice in field, it is almost hopeless to attempt to make a good topographer. When once the surveyor has acquired a little practical knowledge, his own wits will always suggest to him the means of overcoming a difficulty.

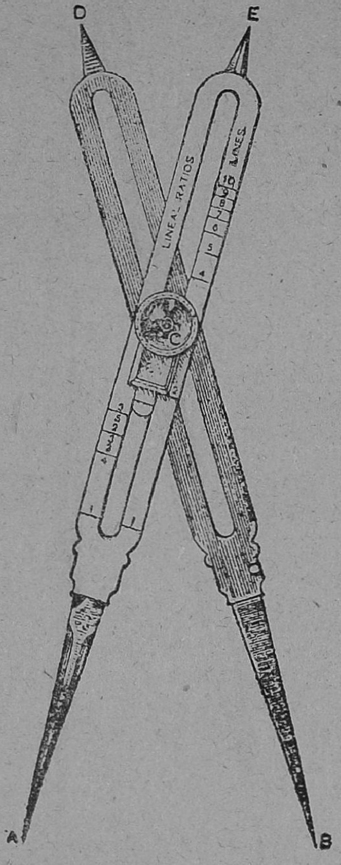
19. It is the facility with which the surveyor plots off direct from nature the angles subtended at his eye by the various objects he may desire to lay down, that renders the plane table a very useful instrument for filling in the details of a survey. He saves much time and avoids all errors to which he would be liable if he observed his angles with a suitable instrument first and then plotted them with a protractor. The plane table should, however, be never used for any work where great accuracy is required.

20. No attempt has been made above to describe the process of sketching hill contours, as this operation is not now, and has not for some years past been, done by the Tamil Nadu Survey Department.



PLOTTING COMPASSES.

(Diagram 1)



PROPORTIONAL COMPASSES.

(Diagram 2)

PLOTTING COMPASSES.

1. Plotting compasses or dividers (*see* diagram 1) consists of two legs movable about a joint so that the points at the extremities of the legs may be set at any required distance from each other. The compasses are used to transfer and measure distances and to describe area and circles.

2. The points of the legs of the compasses are formed of well tempered steel that cannot easily be bent or blunted; and the upper part is formed of brass.

3. The joint is formed of two substances, one side being of brass and the other of steel, the object of this arrangement being to diminish the wear of the parts and to promote uniformity in their motion.

4. When arcs or circles are required to be drawn in pencil or ink, the compasses used are provided with removable points. For describing large arcs or circles, lengthening bar can be attached between the shank and the movable point.

5. In using the compasses, the draughtsman should avoid pressing them heavily on the paper, for this will not only blunt them but cause unsightly perforations in the plan.

PROPORTIONAL COMPASSES.

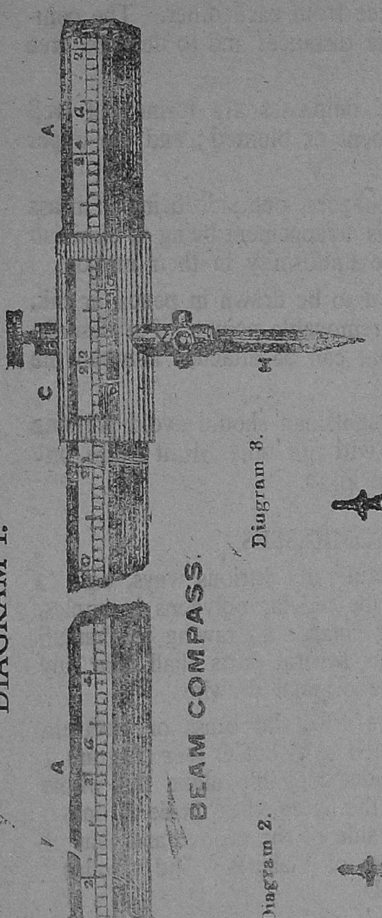
1. This ingenious instrument is useful in various ways, e.g., to extract square and cube roots to inscribe regular polygons in circles, etc. But its chief use is to reduce or enlarge a drawing so that all the lines of the copy represented by its several parts shall bear any required proportion to the lines of the original drawing.

2. Proportional compasses consist of two flat brass or electrum blades tipped with steel points, and united by a nut C (*see* diagram 2 on opposite page) which carries a slider movable along the whole length of the groove of the blades. In the figure, the "Scale of lines" is placed on the blade AE on the left side of the groove and that of "ratios" on the right side. The scales of "planes" and "solids" are on the reverse side of the blade BD.

3. To set the compasses, close them so that the two blades appear as one; unscrew the nut C and move the slider until the line across it coincides with any required division on any one of the scales. Tighten the screw and the compasses are set.

4. To reduce or enlarge a drawing, the line across the slider being set to one of the divisions 2, 3, 4, etc., on the scale of the "lines", the points A, B will open to double, triple or four items, etc. the distances of the points D, E. If, then, the points A and B be opened to the lengths of the lines on the drawing, the points D and E will prick off a copy with the lines reduced in the proportion of ½ to 1, ⅓ to 1, ¼ to 1, etc., but if the points D and E be opened to the

DIAGRAM I.



BEAM COMPASS.

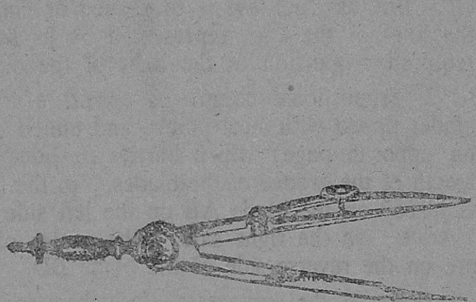


Diagram 2.

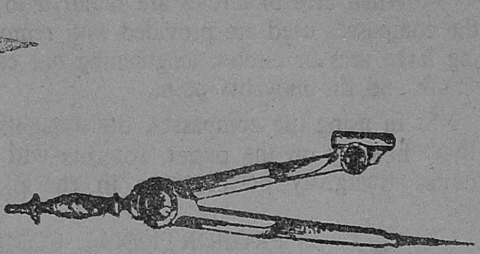


Diagram 3.

BOW COMPASSES.

lengths of the lines on the drawing, the points A and B will prick off a copy with the lines enlarged in the proportion of 2 to 1, 3 to 1, 4 to 1, etc.

BEAM COMPASS

This instrument is used for measuring long distances required in squaring skeleton village maps, or in laying down co-ordinate or graticule lines for the projection of small scale geographical maps.

2. It consists of a beam AA (See diagram) of any length required, and is generally made of well seasoned mahogany.

3. Upon its face is inlaid throughout its whole length a slip of holly or box-wood, a, a, upon which are engraved the divisions of scale , either feet and decimals (millimetres and decimals) inches and decimals (millimetres and decimals) or whatever particular scale may be required. When the divisions or scale are not marked on the beam as it is sometimes the case, the distances required are measured off an independent scale such as the " straightedge ".

4. Two brass boxes B and C, are adopted to the beam, of which the latter may be moved by sliding to any part of its length and fixed in position by tightening the clamp screw E. The screw D fixes the brass box B.

5. The brass boxes are provided with sockets to hold the two steel points G and H, which may be made to have any extent of opening by sliding the box C along the beam, the other box B being firmly fixed at one extremity.

6. Two screws K and K attached to the sockets serve to hold the points firm or to release either of them for a pencil being inserted when a circle has to be described.

7. F is a slow motion screw by which the point G may be moved any very minute quantity for perfecting the setting of the instrument after it has been otherwise set as nearly as possible by the hand alone.

8. Unless the points G and H are truly vertical, they will not measure the correct length indicated by the scale on the beam. It is, therefore, advisable to verify the setting of the instrument by measuring off the distance on the straight edge.

BOW COMPASSES.

1. To describe small acrs or circles of less than one inch radius, a small pair of compass called bow compasses (*see* diagram) fitted with a permanent ink or pencil point, are used.

2. Bow compasses are formed with a round head which rolls with ease between the fingers.

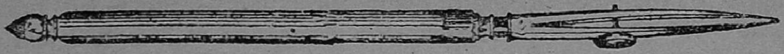


Diagram. 1.

DRAWING PEN.

PARALLEL RULE,

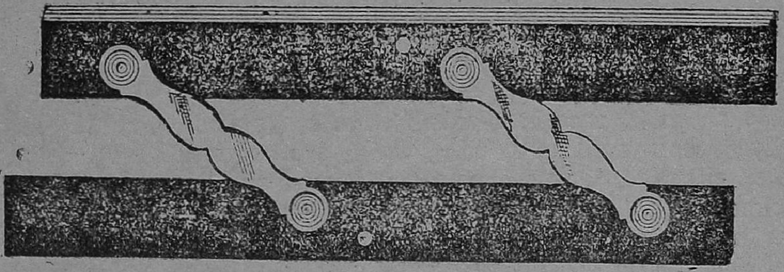


Diagram. 2.

DRAWING PEN.

1. This instrument is used for drawing straight lines in ink in maps.

2. It consists of two evenly pointed blades of steel fixed to a handle (see diagram) and they are so bent as to leave a sufficient cavity between them for the ink.

3. The blades can be moved to or from each other by means of a mill-headed screw passing through them so as to regulate the fineness or thickness of the lines to be drawn.

4. The ink is to be put between the blades by a common pen.

5. When using the pen, it should be held slightly inclined laterally in the direction of the line to be drawn, taking care that the edges of both the blades touch the paper.

6. The ink from the blades of the drawing pen should always be wiped off after use.

7. The blades should not be screwed to a point as their edges are injured by lying in close contact and more apt to contract grit and dust

PARALLEL RULE.

1. Parallel rules are of various kinds and sizes, but the common rule most in use is 6 inches (15 centimetres) long and made of ebony.

2. It consists of two straight rules (see diagram) which are connected together and always maintained in a parallel position by two equal and parallel brass bars, which move freely on the rivets by which they are fastened to the rules.

3. The outer edges of the rules are bevelled in opposite directions, one for drawing pencil and the other for drawing ink lines.

4. This instrument is useful for drawing parallel lines e.g., in the protractor plotting of magnetic bearings in which the magnetic meridian has to be drawn at each station on the plot. For this purpose, set the edge of the upper rule to the given line, press the edge of the lower rule tight to the paper with one hand and with the other move the upper rule till its edge coincides with the given point. A line drawn along the edge through the point will be parallel to the first line.

5. Two brass pins fixed to the rules enable them to be moved with facility.

SCALES

1. A scale is a collection of equal parts used for measuring straight lines and laying down distances, each part representing (one link) 500 m.m. (one foot), 1000 m.m. (one chain) 2000 m.m. (one mile) kilometre, etc., according to the unit assumed.

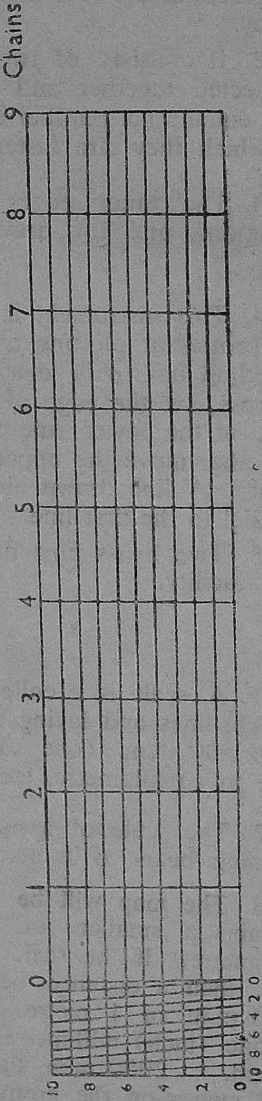
2. The scale of a map is the ratio that the length of a line in the map bears to its actual distance on the ground.

3. The map will be larger or smaller according as the scale contains a smaller or larger number of parts in (an inch) a centimetre. If the scale is (one inch = 1 chain) 1 m.m = 1,000 m.m. then a distance between two points which is (one chain) 1000 m.m. or 1 metre on ground will be represented on the map by one (inch) millimetre. But if the scale is (one inch = 2 chains) 1 m.m. = 2000 m.m. then the distance of (one chain) 2000 m.m. or 2 metres on the ground will be represented on the map by (half an inch) one millimetre.

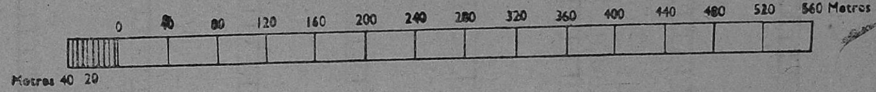
4. The ratio which the measurement of a line on the map bears to the corresponding measurement on the ground is denoted by a fraction called the representative fraction.

SIMPLE SCALE

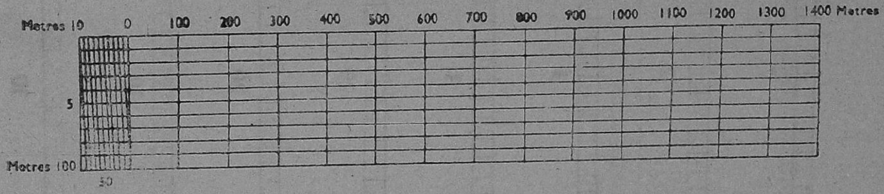
DIAGONAL SCALE.



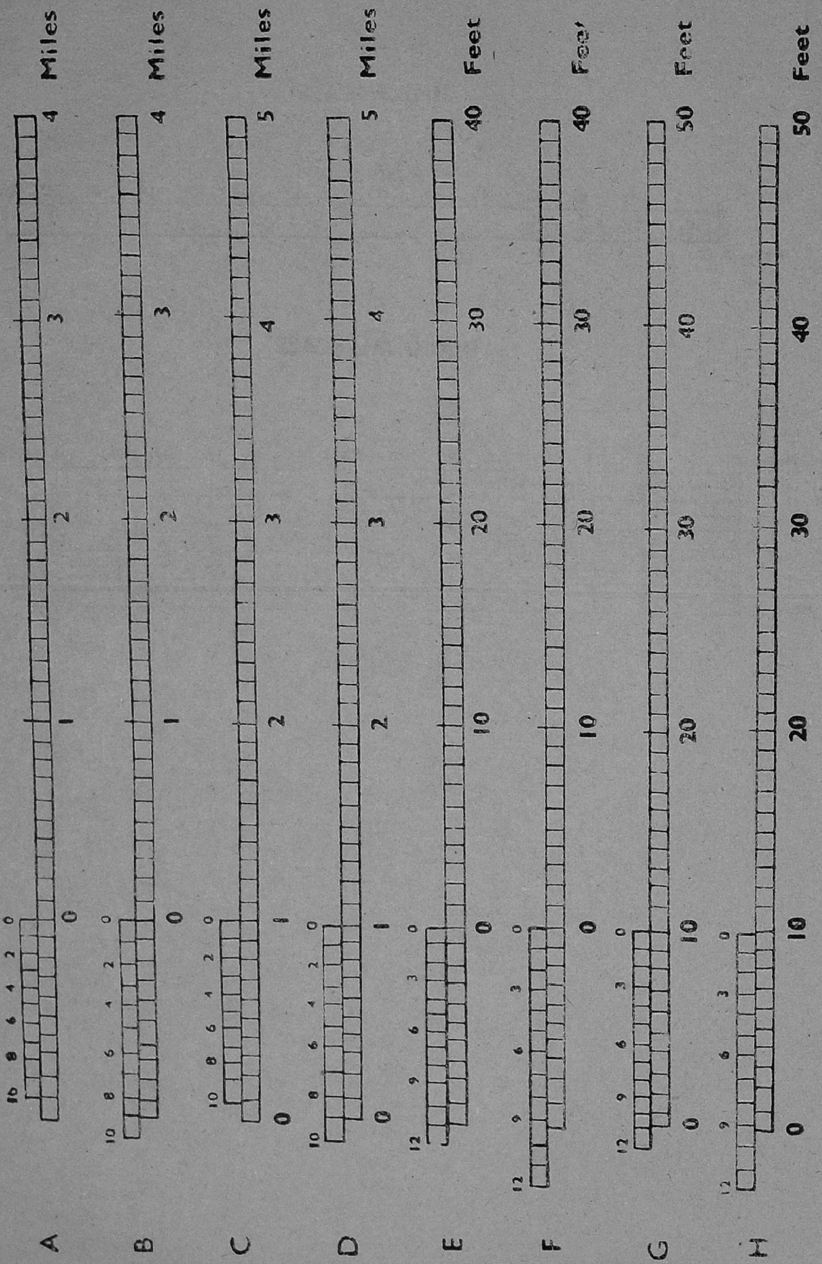
SIMPLE SCALE



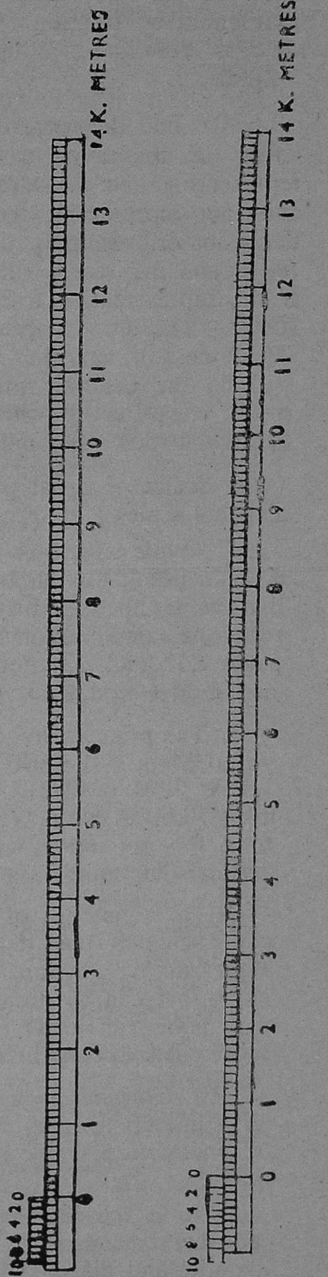
DIAGONAL SCALE



VERNIER SCALE



VERNIER SCALE



In a map of which the scale is 1 m.m. : 1000 m.m. the representative fraction will be 1|1000. In a map of which the scale is 1 m.m. : 2000 m.m., the representative fraction will be 2000.

5. To find the representative fraction of a scale, reduce both the terms of the ratio to a like quantity as inches. (The term representing the measurement on the map will be the numerator and that representing the measurement on the ground will be the denominator. Simplify the fraction until the numerator is reduced to 1, and the result will be the representative fraction. Conversely, if the representative fraction is given, the scale of the map can be found. The term representing the measurement on the map will be the numerator and that representing the measurement on the ground will be the denominator in the representing fraction of scales in metric measures in which the terms of the ratio are expressed in like quantities, viz., millimetres).

6. Scales of equal parts are of three kinds, viz., simple scales, diagonal scales and vernier scales.

7. *Simple scale.*—A simple scale consists of any extent of equal division which are numbered and reckoned forwards from the second division on the left hand to the right O (zero) 1, 3, 5, etc., and from the same division backwards to the left 0, 50 (*see* diagrams on pages 230 and 231 for the simple scales both in the foot pound and metric system.

8. The primary division on the left is generally sub-divided into ten equal parts if the subdivisions be taken as units, each to represent 1 mile (1 Kilometre), for instance, the primary divisions will be so many tens of miles (Kilometres) if the subdivisions be taken as tens, the primary divisions will be hundreds ; and if the primary divisions be units, the subdivisions will be tenths.

9. The measure of the unit to which a simple scale can be constructed to read depends upon the size of scale, i.e., upon its representative fraction, and also upon the greatest number of subdivisions that can be drawn with distinctness in a primary division. A centimetre (an inch) of space cannot conveniently be divided into more than Twenty Five (60) equal parts.

10. *Diagonal Scales.*—When it is required to ascertain the length of a line up to fractions of a unit which are too minute to be drawn distinctly on a simple scale, it is usual to have recourse to a diagonal scale.

11. In the diagonal scale, the primary divisions and subdivisions are the same as in the simple scale, but there are in addition, parallel and diagonal lines as described below.

12. Ten equidistant lines run parallel to the line on which the primary divisions and subdivisions are marked. See diagram on page 230. Through each of the primary divisions run perpendicular lines cutting all the 11 parallels. In the lowest parallel, the primary divisions to the extreme left is subdivided as in the highest, i.e., first parallel. Diagonal lines run from the subdivisions. The first diagonal is from zero in the lowest parallel to the first subdivision in the highest parallel the second diagonal from the first subdivision in the lowest to the second in the highest, and so on to the end, i.e., the diagonal from the ninth subdivision in the lowest parallel to the tenth on the highest parallel.

13. Since these diagonal lines are all parallel, and consequently everywhere equidistant, the distance between any two of them in succession measured upon any of the 11 parrallel lines which they intersect is the same as this distance measured upon the highest or lowest of these parallel lines, i.e., as one of the sub-divisions mentioned above. But the distance between the perpendicular which passes through the starting or zero point and the diagonal through the same point, being nothing on the lowest parallel and equal to one of the sub-divisions on the highest parallel, is equal to one-tenth of a subdivision on the second parallel, to two-tenths of subdivision on the third parallel, and so on; so that this and consequently each of the other diagonal lines as it reaches each successive parallel, separates further from the perpendicular through the zero point by one-tenth of the extent of a subdivision or one-hundredth of the extent of a primary division.

14. *Vernier scales.*—The vernier scale, invented or brought into practical use by Pierre Vernier, a native of Burgundy, about 1631, is an ingenious contrivance for measuring parts of the subdivisions of simple scale.

15. A vernier scale consists of two parts, one, the principal scale and the other, vernier scale. The principal scale is the same as the simple scale described above but with all the primary divisions subdivided instead of only one as in the simple scale. The vernier scale is divided into parts, which, in number are one more or one less than those contained in an equal space on the principal scale.

16. In principal scale in which a primary division measuring say, one inch (centimetre) is divided into 10 equal parts, if it be required to measure hundreds of (an inch), a centimetre, it may be done by means of vernier scale whose length may be either nine tenths of (an inch) a centimetre and divided into 10 equal parts of whose length is eleven-tenths of (an inch) a centimetre and divided into 10 equal parts. For, in either case, the difference between a subdivision of a vernier scale so made and one of the principal scale is hundredth of (an inch) a centimetre.

17. If ten subdivisions on the vernier cover the same space as nine sub-divisions on the principal scale (*see* diagram A on pages 232 and 233) each sub-division on the vernier scale will measure one-tenth less than that of a sub-division on the principal scale. Therefore, one sub-division on the vernier scale will be 1—.1 or.9 sub-division on the principal scale; two sub-divisions on the vernier scale will be 2—.2 or 1.8 subdivisions on the principle scale; and so on, ten sub-divisions or the whole length on the vernier scale will be 10 — 1 or 9 subdivisions on the principle scale; and so on, ten sub-divisions or the whole length

Where 10 subdivisions on the vernier scale cover the same space as 11 subdivisions on the principal scale (*see* diagram B) each sub-division on the vernier scale will measure one-tenth more than a subdivision on the principal scale. Therefore, one subdivision on vernier scale will be 1 + ·1 or 1·1 subdivisions on the principal scale; two subdivisions on the vernier scale will be 2 + .2 or 2.2 subdivisions on the principal scale, and so on; 10 subdivisions or the whole length on the vernier scale will be 10 + 1 or 11 subdivisions on the principal scale.

18. The general principle of a vernier scale is that, if 'a' represents a subdivision on the principal scale, and, if the vernier should read to a|n, n being any number above 1, then x, representing a subdivision on the vernier, will be equal to $\left(\frac{a \mp a}{n}\right) = \left(\frac{n \mp 1}{n}\right) a$;

i.e., if (n ∓ 1) divisions of the principal scale be taken and divided into 'n' parts, the vernier is obtained.

19. The methods of constructing simple, diagonal and vernier scales are explained below.

20. In constructing a scale, it should be considered what will be a good length for it, so as to be able to take off it, at one stretch, long lines though not necessarily the longest on the map. The scales are first drawn in pencil and then inked in.

21. *Construction of simple scales.*—To construct a simple scale of 5 chains to an inch (1 m.m. : 5000 m.m.) or 1 m.m.: 5 metres to read upto 30 chains (750 metres) at a stretch.

As (one inch) 1 m.m. represents (5 chains) 5000 m.m. or 5 metres (30 chains) 750 metres will measure (6 inches) 15 centimetres.

Draw two parallel lines (6 inches) 15 centimetres in length and one tenth of (an inch) 5 millimetres apart, taking the measurement from a box wood scale of (inches) centimetres.

Divide the parallel lines into 15 equal parts of primary divisions and subdivide each primary division into ten (twenty) equal parts.

Each of the primary divisions which will be (one chain or 100 links) 50,000 m.m. or 50 metres and each subdivisions will be one tenths of a chain or 10 links 2,500 m.m. or 2½ metres.

Beginning from the second primary division which should be marked zero, number the primary division to the right 1, 3, 5, etc., to 29 and the subdivisions to the left 50 and 100 (*see* diagram on page 230) write chains at the extreme right and links at the extreme left.

Now to take off 1,680 links, i.e., 16 chains and 80 links, place one leg of the plotting compasses on the primary division denoting 16 and open the other leg on to the 8th subdivision mark from zero or the third beyond the subdivision numbered 50. The length included between the points of the compasses will be 1,680 links. The starting end in the left should be marked zero and succeeding lines indicating a centimetre should be marked as 50,100 upto 750. Write metres at the extreme right. The length needed can be taken from the scale directly by the plotting compasses.

22. *Construction of diagonal scales.*—To construct a diagonal scale of (2 chains to an inch) 1 m.m : 2,000 m.m. to read (upto chains and links upto 10 chains) 200 millimetres and upto 300 metres at a stretch. Draw a line (5 inches) 15 centimetres in length and divide it into (10) 15 equal parts or primary divisions. Draw (10) 5 equidistant lines parallel to the first, about one-tenth of (an inch) millimetres apart from one another. Through each of the primary divisions, draw perpendicular lines cutting all the eleven parallel lines.

Beginning from the second primary division, which should be marked O (zero) number the primary division to the right, (1, 2, 3, 4 to 9) 20, 40, 60 etc., to 280 above the highest parallel.

Write the numbers (0, 2, 4, 6, 8 and 10) 0, 1, 2, 3, 4, 5 upwards at the left hand ends of the alternative parallels,

Sub-divide the first primary division to the extreme left into (10) 20 equal parts both on the highest and the lowest of the (11) 6 parallels. Number the divisions to the left 0, 2, 4, 6, 8 and 10, 12, 14, 16, 18, 20 below the lowest parallel.

With the parallel rule, draw the diagonal lines from 0 in the lowest parallel to the first sub-division in the highest parallel from the first in the lowest to the second in the highest and so on, until the diagonal from the nineteenth in the lowest parallel to the twentieth in the highest is drawn.

Now to take off (768 links) twenty seven metres and 400 millimetres place one leg of the plotting compasses where the (eighth) third parallel line cuts (the sixth) seventh diagonal and open the other leg and place it where the same point cuts the (7th) 2nd perpendicular.

23. The number of parallel lines to be drawn will depend upon the fraction of a sub-division that is required to be read off.

24. The general rule for taking off any measurement to three places of figures (in metres and millimetres) on the parallel lines indicated by the third figure the number of hundreds of millimetres measured from the diagonal indicated by the second figure (number of metres in the single digit) to the perpendicular indicated by the first (10th and 100th digit in the metres to be measured).

25. *Construction of Vernier Scales.*—To construct a vernier scale of one (mile) Kilometre (to an inch) to a centimetre to read (miles) Kilometres and tenths and hundredths of a (mile) Kilometre to (5 miles) 15 Kilometres at a stretch.

As one (inch) centimetre represents 1 (mile) Kilometre (5 miles) 15 Kilometres will measure (5 chains) 15 centimetres. Draw 2 parallel lines (5 inches) 15 centimetres in length and one-tenth of (an inch) 5 millimetres apart.

Divide the parallel lines into (5) 15 equal parts of primary divisions and sub-divide all the primary divisions, into ten equal parts.

Beginning from the second primary division, which should be marked zero, number the primary divisions to the right 1, 2, 3, 4 below, the lower parallel.

Take off with the compasses nine of the sub-divisions, set this length off backward from the end of the first primary division i.e., from the place marked 0. Now sub-divide the space thus set off into 10 equal parts, numbering the divisions, above the upper parallel 2, 4, 6, 8, 10 to the left, commencing from 0 of the primary division.

Now to take off 2.53 (miles) Kilometres or 2.53 (inches) centimetres, place one leg of the compass at 10—3 or the seventh division on the vernier and extend the other leg to 25 (7—1) or 19 or 1.9 on the principal scale.

26. The following is the general rule for taking off measurements on a vernier scale upto three places of figures in the case just described, i.e., when the vernier is divided into parts which in number are one more than those contained in an equal space on the principal scale.

Deduct the third figure from the total number of divisions on the vernier. Place one leg of the compasses on the division of the indicated by the number thus obtained. Deduct from the first two figures the number of the vernier division obtained as above less one, and the balance will give the number of the division on the principal scale to which the other leg of the compasses should be extended.

When, as in diagram B, the vernier is divided into parts which in number are one less than those contained in an equal space on the principal scale, the rule will be as follows:—

Place one leg of the compasses on the division of the vernier indicated by the third figure, and extend the other leg to the division on the principal scale indicated by the number obtained by deducting the third from the first two figures.

To take off 2.53, place one leg of the compasses at 3 on the vernier and extend the other leg to 25-3 or 22 or 2.2 on the principal scale.

27. The above two rules apply when the numbering of the divisions on the principal scale commences from the second primary division. But if the numbering commences from the very extreme left as in diagram C and D, the following rule should be observed.

28. When, as in diagram C, the vernier is divided into parts which in number are one more than those contained in an equal space on the principal scale, deduct the third figure from the total number of divisions on the vernier. Place one leg of the compasses on the division of the vernier indicated by the number thus obtained. Deduct from the first two figures the number of the vernier division thus obtained less one, and the balance with the addition of one to the first figure will give the number of the division on the principal scale to which the other leg of the compasses should be extended.

To take off 2.53, place one leg of the compasses at 10.3 or the seventh division on the vernier and extend the other leg to 2.9 on the principal scale which is obtained thus. 1 deducted from 7 is 6. Subtract 6 from 25. To the first figure of the balance, i.e., 19 add 1, and the result will be 29 or 2.9 on the principal scale.

29. When, as in diagram D, the vernier is divided into parts which in number are one less than those contained in an equal space on the principal scale, place one leg of the compasses on the division of the vernier indicated by the third figure. Deduct the third from the first two figures and the balance with the addition of one to the first figure will give the number of the division on the principal scale to which the other leg of the compasses should be extended.

To take off 2.53, place one leg of the compasses at 3 on the vernier, and extend the other leg to 3.2 on the principal scale, which is obtained thus. Subtract 3 from 25. To the first figure of the balance, i.e., 22 add 1 and the result will be 32 or 3.2 on the principal scale.

30. In all the above four cases, a primary division on the principal scale having been taken to represent units, the sub-divisions denoted tenths and consequently the vernier read hundredths. If it be required to construct a vernier scale to read any other fraction, say 1|12th of a sub-division of the principal scale, e.g., if the sub-division on the principal scale denoted feet and it was required to read inches, the

vernier should occupy the space of either 11 or 13 of the sub-divisions on the principal scale, and be divided into 12 equal parts vide diagrams E, F, G and H. Then, for taking off measurements from scales so constructed the four rules given above will apply, with the proviso that the number of centimetres (inches) to be read off, whether they consist of one or two digits, will be reckoned as the third figure.

31. A vernier scale is preferable to a diagonal scale, because, in the latter, it is extremely difficult to draw the parallels, perpendiculars and diagonals with accuracy; while in the former, the uniform manner in which the strokes of one scale separate from those of the other is evidence of the accuracy of both.

32. Theodolites and other instruments for reading angles are provided with movable verniers with which to read angles up to one minute, 30 seconds or 10 seconds, according as the horizontal circle or limb of the instrument is divided to half degree or 30 minutes one third degree or 20 minutes and one-sixth degree or 10 minutes. The method of reading angles by means of verniers is explained in rule 41, under the head of " Theodolite ".

33. *Plotting Scales*.—The plotting scale is a straight rule of ivory or boxwood about (12 inches) 30 centimetres long and (1¼ inch) 3.2 centimetres in width. It has a scale of equal parts decimally divided, placed upon its edges which are made sloping so that the graduations marking the divisions may be close to the paper. There is a double set of numbers, the upper one commencing from the left and reading (1, 2, 3) 10, 20, 30, etc., to the right and the lower commencing from the right and reading (1, 2, 3) 10, 20, 30, etc., to the left.

34. At the middle of the scale are generally cut numbers such as 10, 20, 33, 50 which denote the number of equal parts into which (an inch) a centimetre of space on the scale is divided, and the names of the scales are derived from them. These are the four scales generally used in the Tamil Nadu Survey and Land Records Department.

In the scale of 10, each inch is a primary division denoting a gunter's chain. The primary divisions are divided each into ten sub-divisions, each sub-division, therefore representing one-tenth of a chain or 10 links. This scale is generally termed a scale of 1 inch = 2 chains or 80 inches = 1 mile.

In the scale of 20, each inch consist of two primary divisions; each primary division denotes a chain and is divided into ten sub-divisions each sub-division, therefore representing one-tenth of a chain or ten links. This scale is generally termed a scale of 1 inch = 2 chains or 40 inches = 1 mile.

In the scale of 33, the entire length of the scale is divided into 40 primary divisions each of which is sub-divided into ten parts. If each primary divison is reckoned as one "feet chain", each sub-division will represent ten feet; if each sub-division is taken to indicate one foot, one inch of space containing 33 sub-division will represent 33 feet. This scale is generally termed a scale of 1 inch = 330 feet, i. e., 16 inches = 1 mile or 1 inch = 33 feet; i.e. 160 inches = 1 mile.

In the scale of 50, each inch consists of five primary divisions or chains. Each primary division is divided into ten parts, each sub-division therefore, representing one tenth of a chain or ten links. This scale is generally termed a scale of 1 inch = 5 chains or 16 inches = 1 mile.

At the middle of the scale are generally cut, the scales for which the divisions have been designed. Two types of scales require to be generally used in the Tamil Nadu Survey and Land Records Department.

In the scale of 1 mm. : 1,000 mm. each centimetre is a primary division denoting 10.000 millimetres of 10 metres. Each of the primary divisions is divided into ten sub-divisions. Each sub-divisions will therefore, represent one metre.

This scale can be used for plotting to the scale of 1 mm. : 500 mm. Each sub-division will then represent 500 mm. and each primary division 5,000 m.m. or 5 metres.

In the scale of 1 m.m. : 5,000 m.m. each centimetre consists o 2 primary divisions, and each primary division consists of 10 sub. divisions. Each primary division denotes 25 metres and each sub. division represents 2,500 millimetres or 2½ metres.

35. For the sake of convenience, graduations for the scale of 50, i.e. 16 inches = 1 mile and 20, i.e., 40 inches = 1 mile are both marked on the same, one on each edge.

For the sake of convenience, graduations for the scale of 1 m.m. : 1,000 m.m. and of 1 m.m. : 5,000 m.m. are both marked on the same scale one on each edge.

36. *Offset scales.*—With each plotting scale is used a smaller scale called the offset scale, which is made of the same material as the plotting scale and is similarly divided. The offset scale is about 5 centimetres long and is graduated to read upto 50 metres in a scale of 1 m.m. : 1,000 m.m. and up to 250 metres in a scale of 1 m.m. : 5,000 m.m.

The offset scale is used to set off the offsets from the chain line in the map along which one of the bevelled edges of the plotting scale is laid.

37. *Straight edge.*—When distance beyond the length of the plotting scale have to be measured off plans, or have to be plotted on them, the instrument called the straight edge, is used together with the beam compass already described.

The straight edge is a flat piece of metal, the shortest used being (2 feet) 60 centimetres in length and the longest (4 feet) 120 centimetres. It is bevelled on one edge and is graduated to (inches and tenth) centimetres and millimetres. Diagonal scales are placed at both ends to read to tenths and hundredths.

PROTRACTOR.

1. The protractor is an instrument used to protract or lay down an angle containing any number of degrees or to find how many degrees are contained in any given angle. It is also used to protract the bearings of lines.

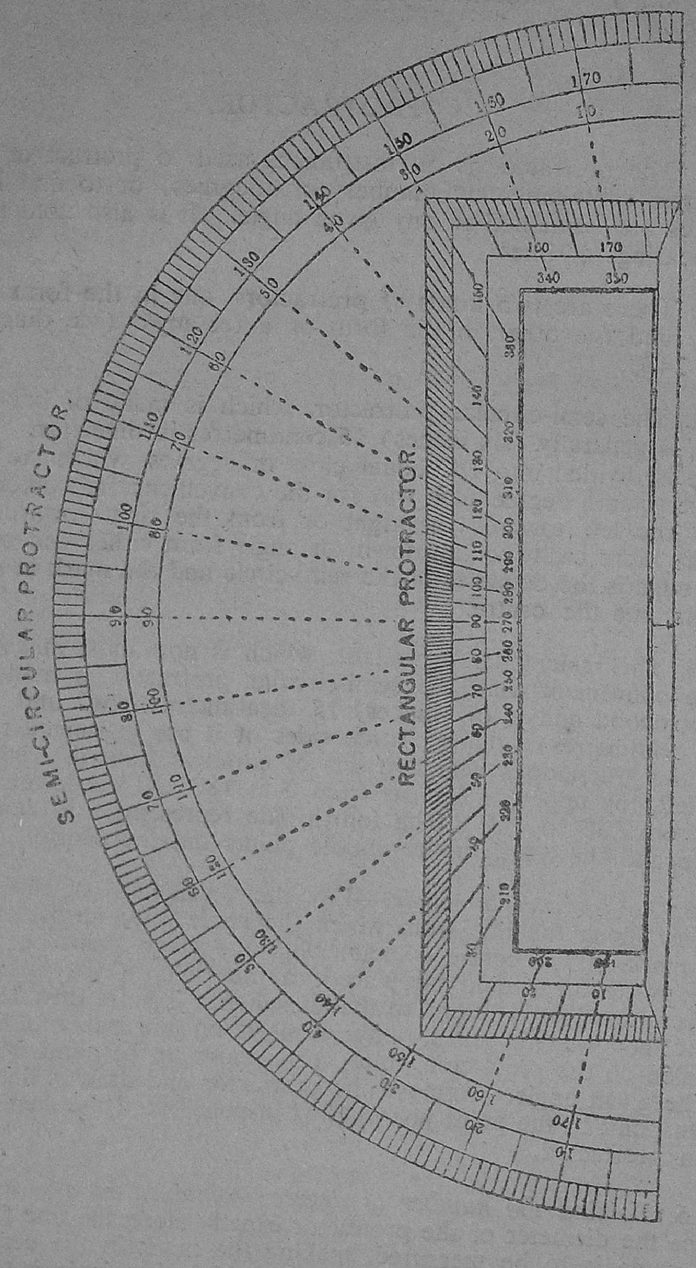
2. There are two kinds of protractors, one in the form of a semi-circle and the other in the form of a rectangle (see diagrams on page 242).

3. The semi-circular protractor, which is made of brass or electrum, is generally (six inches) 15 centimetres in diameter. The semi-circle is divided into 180 equal parts or degrees, which are numbered at every tenth degree each way for the convenience of reckoning either from the left towards the right or from the right towards the left, or the more easily to lay down an angle from either end of the line. The edge is the diameter of the semi-circle and the mark in the middle points out the centre.

4. The rectangular protractor, which is now most in use as being more convenient than the semi-circular protractor is made of ivory or boxwood and is (6 inches) 15 centimetres long and 1¾ inches (4½ centimetres) broad. Three sides of it are graduated to degrees, and the graduations bear two sets of numbers from the right towards the left, the upper or first set from 0 to 180 and the lower or second set from 180 to 360. The fourth side represents the diameter of a circle and the mark in the middle points out the centre.

5. *To protract an angle.*—Lay the diameter of the protractor exactly along the line from which the angle is to be set off, making the mark in the centre coincide with the given point on the paper. The protractor should be placed to the right of the line when the angle is less than 180 and to the left when it is more than 180. Then, with fine pointed pencil, make a mark on the paper close to that division on the protractor which corresponds to the number of degrees in the given angle. Remove the protractor and draw a line from the given point to the point just marked in pencil, and the angle will have been protracted.

6. *To find the number of degrees contained in a given angle.*—Place the diameter of the protractor exactly along the line from which the angle is to be measured, making the mark in the centre of the protractor coincide with the point at which the single is to be measured. The protractor should be placed to the right of the line, when


SEMI-CIRCULAR PROTRACTOR.
RECTANGULAR PROTRACTOR.

the other line forming the angles is on the right, and to the left when the other line is on the left. The division on the protractor that is cut by the other line, produced if necessary, will denote the number of degrees contained in the given angle.

7. *How to protract the bearing of a line.*—Through the starting point of the line whose bearing has to be protracted, draw a line due north and south to represent, the meridian, lay the diameter of the protractor along the meridian, making the mark in the centre coincide with starting point. Place the protractor to the right or left of the meridian line according as the bearing of the line is less or greater than 180°. Make a pencil mark on the paper close to the division on the protractor corresponding to the number of degrees in the given bearing. The line drawn from this mark to the starting point will be in the direction indicated by the given bearing.

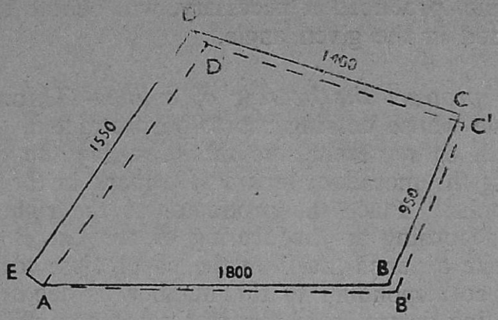
8. When this line is the first of a circuit surveyed with the prismatic compass, and it is required to plot the circuit, lay off from the starting point the total length of the line as measured. The end of the line will mark the position of the second point or station of the circuit. Through this station, with the parallel rule, draw a line parallel to the first meridian line and proceed to protract the bearings and lay off the distances as above for the remaining stations of the circuit until the starting point is reached.

9. When a circuit has been surveyed with the theodolite or stanley's circumferenter and the angles at all the stations and the bearings of any one line are available the circuit can be plotted with the protractor. The line of which the bearing is given is plotted first as explained in rule 7 above, and then the succeeding lines in the manner explained in rule 5.

10. Protractors are generally graduated to degrees only. When the angles or bearings to be protracted contain minutes, the nearest fraction of a degree which they represent should be estimated by the eye and the protraction made accordingly.

11. Even when a circuit has been correctly surveyed, a plot of the survey may not close owing to the defects inherent in the process of plotting with the protractor. When this is the case, the error should be adjusted as explained below.

Let ABCDE be the boundary lines plotted according to the given bearings and distances; and suppose that the last distance comes to E instead of closing at A as it should.



The error must be distributed among all the lines, in proportion to their lengths. Each point B, C, D, E, in the figure must be moved in a direction parallel to EA, by a certain distance which is obtained thus :—

Multiply the distance EA by the distance AB and divide the product by the sum of all the distances. The quotient will be the distance BB'. To get CC', multiply EA by AB + BC and divide the product by the sum of all the distances. To get DD', multiply EA by AB + BC + CD and divide the product as before. So, for any distance multiply the amount of error by that distance plus the distances preceding it and divide the product by the sum of all the distances.

Join the points thus obtained, and the closed polygon AB' C' D' A will thus be formed and will be the most probable plot of the given survey.

PANTAGRAPH.

1. The pantagraph is an instrument for copying, enlarging or reducing drawings. There are two kinds of this instrument, one called the "English pantagraph" and the other, the "French pantagraph".

ENGLISH PANTAGRAPH.

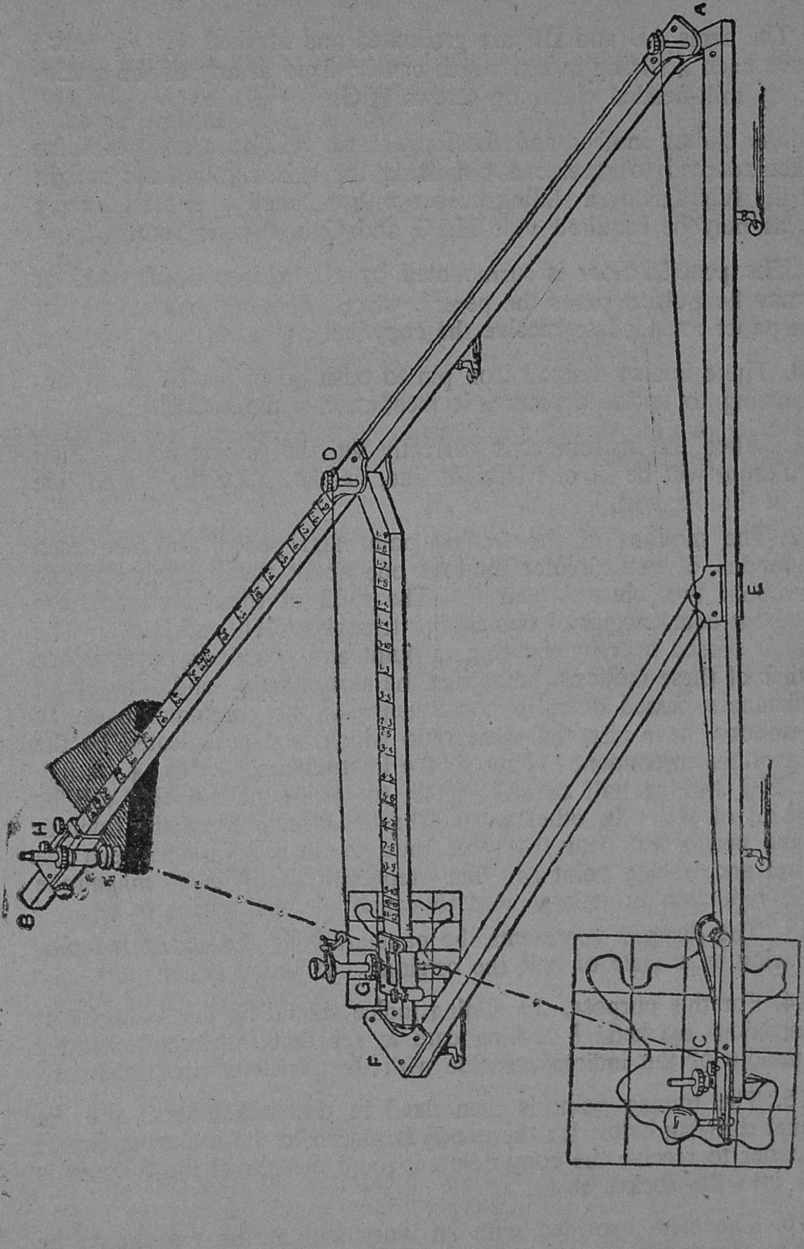
2. This consists of four arms, AB, AC, DF and EF (see diagram) made of stout brass.

3. The two longer arms, AB and AC are connected together at and have a motion round, a centre A.

4. The two shorter arms, DF and EF are in like manner connected with each other, at, and have motion round F. They are also connected with the longer arms at, and have motions round, D and E.

5. The shorter arms, being equal to each other and also to the portions AD and AE of the longer arms, form with the latter a rhombus, ADFE, in every position of the instrument.

6. Several ivory castors support the instrument parallel to the table and, working with swivels, allow the instrument to move freely over the table in all directions.



ENGLISH PANTAGRAPH.

7. The arms AB and DF are graduated and marked $\frac{1}{2}$, $\frac{1}{3}$, etc., and have each a sliding index, which can be fixed at any of the graduation; by mill-headed clamping screws H.G.

8. The sliding indices and the longer arm AC have each of them a socket adapted to receive a pin rising for a heavy metallic weight called the fulcrum, or a sliding holder with a pencil or a steel tracing point, as may be required vide H, G and C in the diagram.

9. The pencil holder is surmounted by a cup, into which sand or shot may be put, to press the pencil, when necessary, more heavily on the paper intended to receive the copy.

10. There is also a small iron pin to push down the pencil, whenever, owing to undue pressure, it recedes into the socket.

11. When the instrument is correctly set, the tracing point, pencil and fulcrum will be in one straight line, as shown by the dotted line CGH in the diagram.

12. The motions of the tracing point and pencil are then each compounded of two circular motions one about the fulcrum and the other about the joints A and F. The radii of these motions form sides about equal angles of two similar triangles CHA and GHD. The distances passed over by the tracing point and pencil, in consequence of either of these motions, have then the same ratio and, therefore, the distances passed over, in consequence of the combination of the two motions, have also the same ratio which is that indicated by the setting of the instrument. Thus, if the instrument is set to $\frac{1}{2}$ reductions, HG will be half of HC; if set to $\frac{1}{3}$ reduction, HG will be one third of HC. In other words, the distance between the fulcrum and the pencil will bear the same ratio to the distance between the fulcrum and tracing point as that represented by the magnitude of the reduction or enlargement to which the instrument is set.

13. The diagram represents the pantagraph in the act of reducing a drawing to a scale of half the original.

14. For this purpose, the sliding indice should be first clamped at the divisions marked $\frac{1}{2}$ taking care to see that the lines indicating the middle of the indices coincide with the divisions concerned.

15. The tracing point is then fixed in the socket at C and the original drawing below it; the pencil is placed in the socket at G and the paper to receive the copy below it; and the pin of the fulcrum is fixed into the socket at H.

16. The stem provided with an ivory ball at the top should be fixed to the small bar attached to the end of arm AC.

17. The fine thread, represented as passing from the pencil round the hinges at D and A to the tracing point at C, enables the draftsman

at the tracing point to raise the pencil from the paper whilst he passes the tracing the point from one part of the original to another, and thus to prevent false lines from being made on the copy. The thread should be fastened at the hinge between the tracing point and the ivory ball, just tight enough to allow sufficient play to the pencil. The left hand should work the thread, the right hand holding the ivory ball and guiding the tracing point.

18. The instrument being now ready for use, if the tracing point at C be steadily and delicately passed over every line of the original, a true copy, but of one-half the scale of the drawing will be marked by the pencil on the paper beneath it.

19. If the reduction required is to a scale of one-third of the original, the fulcrum, pencil and tracing point should occupy the same position as before, but the indices should be moved and clamped at the divisions marked $\frac{1}{3}$.

20. To enlarge the drawing to double its scale, the positions of the tracing point and pencil should be reversed, i.e., the tracing point should be placed at G and the pencil at C.

21. When the enlargement required is three times the original, the positions of the tracing point and pencil should remain the same as described in the preceding rule, but the sliding indices should be moved to the divisions marked $\frac{1}{3}$.

22. If the copy required is to be of the same scale as the original, the sliding indices should be clamped at the same divisions as for half reduction, i.e., at the divisions marked $\frac{1}{2}$, but the fulcrum should be placed at the middle socket at G and the pencil and tracing point at either of the other two sockets H and C.

23. For reductions to half scale and below half, the fulcrum should occupy the position of H in arm AB, the pencil that of G in arm DF and the tracing point that of C in arm AC, and the indices clamped at the divisions concerned,

24. For reductions to scales above, half, the fulcrum, pencil and tracing point should occupy the positions G, H and C respectively.

25. For enlargements, the fulcrum, pencil and tracing point should occupy the positions H, C and G respectively.

26. The English pantagraph contains divisions marked $\frac{1}{2}$, $\frac{2}{5}$, $\frac{1}{3}$, $\frac{3}{10}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$ and $\frac{1}{9}$.

Between the divisions $\frac{1}{2}$ and $\frac{1}{3}$, there are further divisions mraked $\frac{11}{12}$, $\frac{10}{11}$, $\frac{9}{10}$, $\frac{8}{9}$, $\frac{7}{8}$, $\frac{6}{7}$, $\frac{5}{6}$, $\frac{4}{5}$, $\frac{3}{4}$, $\frac{2}{3}$ and $\frac{3}{5}$.

27. The divisions at which the instrument should be set and the positions which the fulcrum, pencil and tracing point should occupy for the various reductions and enlargements, are shown in the subjoined statement.

Reduction or enlargement.	Magnitude of reduction or enlargement required.	Division at which the instrument should be set up.	Position to be occupied by		
			Fulcrum.	Pencil.	Tracing point.
Reduction ..	$\frac{1}{2}, \frac{1}{3}, \frac{3}{10}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}. \frac{1}{9}.$	$\frac{1}{2}, \frac{1}{3}, \frac{3}{10}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}.$	H	G	C
Do.	$\frac{11}{12}, \frac{10}{11}, \frac{9}{10}, \frac{8}{9}, \frac{7}{8}, \frac{6}{9}, \frac{5}{\text{[illegible]}}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}, \frac{3}{6}.$	$\frac{11}{12}, \frac{10}{11}, \frac{9}{10}, \frac{8}{9}, \frac{7}{8}, \frac{6}{7}, \frac{5}{6}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}, \frac{8}{5}.$	G	H	C
Do.	$\frac{11}{23}, \frac{10}{21}, \frac{9}{19}, \frac{8}{17}, \frac{7}{15}, \frac{6}{13}; \frac{5}{11}, \frac{4}{0}, \frac{3}{7}, \frac{2}{5}, \frac{3}{8}.$	$\frac{11}{12}, \frac{10}{11}, \frac{9}{10}, \frac{8}{9}, \frac{7}{8}, \frac{7}{6}, \frac{5}{6}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}, \frac{3}{5}.$	H	G	C
Enlargement.	2, 3, $\frac{10}{3}$, 4 5, 6, 7, 8, 9.	$\frac{1}{2}, \frac{1}{3}, \frac{3}{10}. \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}.$	H	C	G
D	$\frac{23}{1}, \frac{21}{10}, \frac{19}{9}, \frac{17}{8}, \frac{15}{7}, \frac{13}{6}, \frac{11}{5}, \frac{9}{4}, \frac{7}{3}, \frac{5}{2}, \frac{8}{3}.$	$\frac{11}{12}, \frac{10}{11}, \frac{9}{10}, \frac{8}{9}, \frac{7}{8}, \frac{6}{7}, \frac{5}{6}, \frac{4}{5}, \frac{3}{4}, \frac{2}{3}, \frac{3}{5}.$			
Copy to scale.	..	$\frac{1}{2}$	G	H or C	cor H

FRENCH PANTAGRAPH.

28. The Chief points of difference between this pantagraph and the English pantagraph described above, are the following :—

(1) One of the four arms of the french pantagraph B' A' (See diagram) is not permanently joined to the other arms of the instrument but is removable and is kept separate from the other arms when the instrument is placed in the box. When the instrument is fitted up, this removable arm is attached to the arms DB and CA by means of its sliding indices B' and A'.

(2) The movements of the joints at C and D, before the instrument is set up, are not limited but admit of the arms DB and CA being turned right round their axis.

(3) Three arms DB, CA and B' A' are graduated and not two as in the case of the English pantagraph.

(4) The graduations on the three arms are similar and are in regular descending order from $\frac{3}{4}$ to $\frac{1}{20}$ commencing from the ends marked D, C and B' respectively.

(5) The ivory castors are loose and are fitted on when setting up the instrument.

(6) The sliding indices B', A', C' and the slides P and K do not have lines, indicating their middle, cut on them, but their ends are bevelled on one side so as to allow of their being correctly set to the divisions required.

29. Being more delicate in its construction than the English pantagraph some care is necessary in handling the French pantagraph.

30. The directions given below for lifting it from its box and placing it in proper position for use should be carefully observed :—

(1) Before lifting the instrument from the box, the positions which the various parts occupy should be carefully noted. Letters A, B, C, D, and K corresponding to those cut on the instrument, should be noted in pencil in the box.

(2) Then, with the right hand, take hold of the extremities P and K, raise them and slide the left hand under the arms to the other extremities B and C, lift the instrument bodily from the box and place it on the table.

(3) With the right hand hold the arm K and with the left the arm P, open and expand the arms until the axis at C forms a right angle with P and K.

(4) Then, by means of the side B' of the removable arm, attach it to the arm DB, keeping the small clamping screw (of the slide) on the outside to the right.

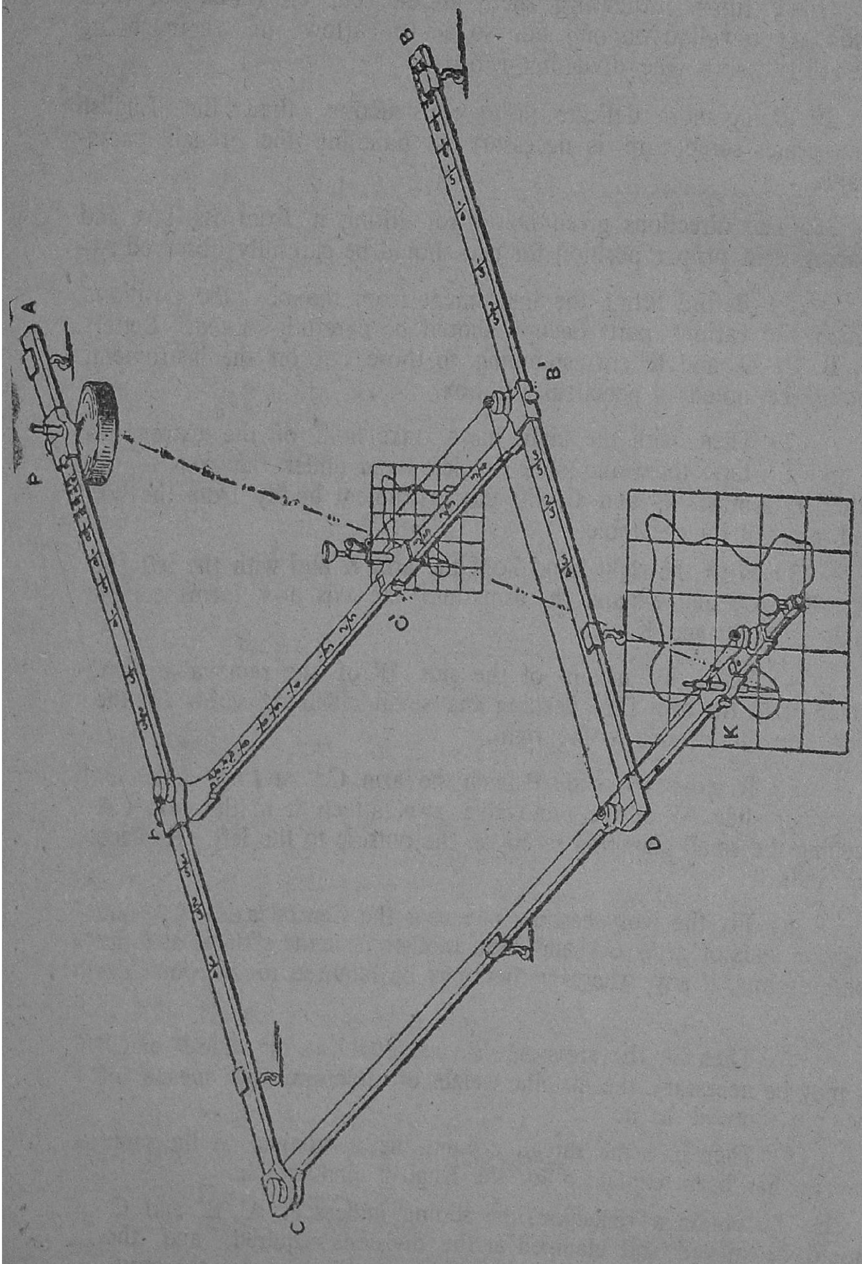
(5) Remove the slide P from the arm CA and by means of the other slide A' of the removable arm, attach it to the arm CA keeping the small clamping screw on the outside to the left. Replace the slide P.

(6) Fix the ivory castors, one near the Central axis, C, one each on ends of arms CA and DB, another near the slide K and the spare castors, if any, wherever they may be required to support the arms.

(7) Then lift the arms A', B', and attach to the slide P or C', as may be necessary, the metallic weight or fulcrum, by means of the pin screwed to it.

(8) Then pass the thread around the instrument in the same way as has been explained for the English pantagraph.

31. To obtain a reduction, the sliding indices at A', B' and C should be moved and clamped at the divisions required, and the slides P and K should be clamped at the zero lines cut on the arms



FRENCH PANTAGRAPH.

The fulcrum should be attached to the socket in the slide P, the tracing point to the socket in the slide K and the pencil to the socket in the sliding index C'. The diagram shows the instrument in this position.

32. For obtaining an enlargement, the positions of the fulcrum and the pencil should be reversed, i.e., the fulcrum should be placed at C' and the pencil at P.

33. There are graduations in the French pantagraph for obtaining enlargements to $1\frac{1}{2}$ times double and treble the scale only of the original.

34. If the copy required is to be of the same scale as the original, the sliding indices should be clamped at the divisions marked $\frac{1}{2}$, the positions of the fulcrum and the pencil remaining the same as for an enlargement.

35. If in the position set for an enlargement the indices are clamped at the divisions less than half, the result will not be an enlargement but a reduction as shown in the following tables :—

Reduction or enlargement.	Magnitude of reduction or enlargement required.	Division at which the instrument should be set.	Position to be occupied by		
			Fulcrum.	Pencil.	Tracing point
Reduction ..	$\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{2}{[illegible]}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{1[illegible]}$, $\frac{1}{20}$	$\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{1}{2}$, $\frac{2}{5}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, [illegible], $\frac{1}{12}$, $\frac{1}{15}$, $\frac{1}{20}$.	P	C′	K
Do.	$\frac{2}{3}$, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{7}$, $\frac{1}{9}$, $\frac{1}{11}$, $\frac{1}{14}$, $\frac{1}{19}$.	$\frac{2}{5}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{15}$, $\frac{1}{20}$.	C′	P	K
Enlargement.	3, 2, $\frac{3}{2}$	$\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{5}$	C′	P	K
Copy to scale.	....	$\frac{1}{2}$	C′	P	K

36. Whenever enlargements or reductions are made by a pantagraph, squares must be drawn in pencil both on the original map and on the paper which is to receive the enlargement or reduction. The side of a square in enlargement or reduction required should bear the same ratio to the side of a square in the original as that which the enlargement or reduction bears to the original. The

following table gives the size of squares most convenient for various scales of maps :—

Scale of original—Inches to a mile.	Enlargement. Side of square to be drawn in original and enlargement.	Reduction. Side of square to be drawn in original and reduction.
64	¼ mile.	½ mile.
32	¼ ,,	⅛ ,,
16	¼ ,,	½ ,,
8	½ ,,	1 ,,
4	½ ,,	1 ,,
2	1 ,,	2 miles.
1	2 miles.	4
½	4 ,,	8 ,,
¼	8 ,,	16 ,,
⅛	16 ,,	32 ,,
1 m.m : 500 m.m.	800 m.m.	500 m.m.
1 m.m : 1000 m.m.	400 m.m.	800 m.m.
1 m.m. : 2000 m.m.	200 m.m.	400 m.m.
1 m.m. : 5000 m.m.	100 m.m.	200 m.m.
1 m.m. : 10000 m.m.	100 m.m.	200 m.m.
1 m.m. : 50000 m.m.	50 m.m.	100 m.m.
1 m.m. : 1,25,000 m.m.	50 m.m.	100 m.m.
1 m.m. 2,50,000 m.m.	50 m.m.	100 m.m.
1 m.m. : 5,00,000 m.m.	50 m.m.	100 m.m.

37. To secure correct results, the pantagraph should, as a rule, be worked by two men, one standing at the tracing point and the other at the pencil.

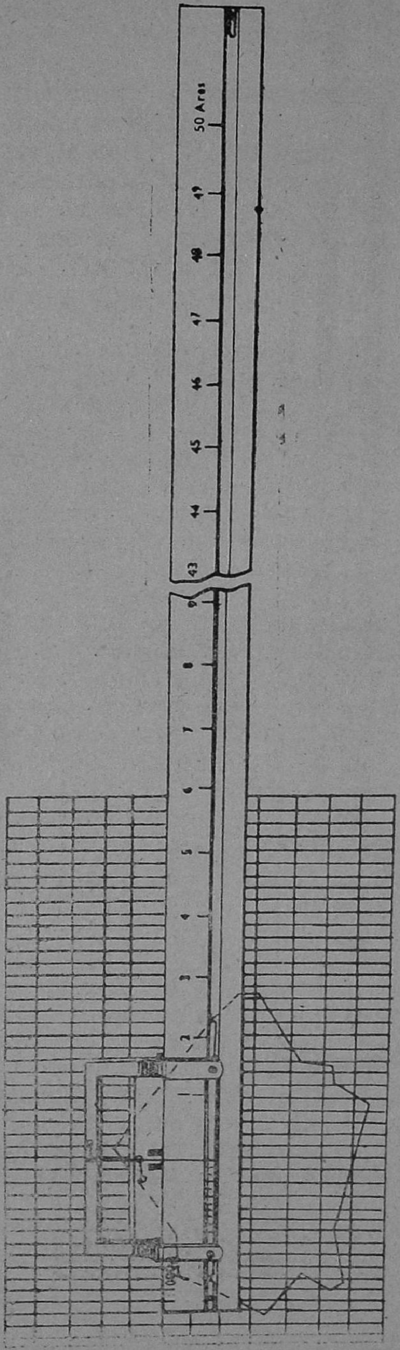
38. Of late years, the photographic camera has largely taken the place of the pantagraph in obtaining reductions, enlargements or copies of drawings.

COMPUTING SCALE.

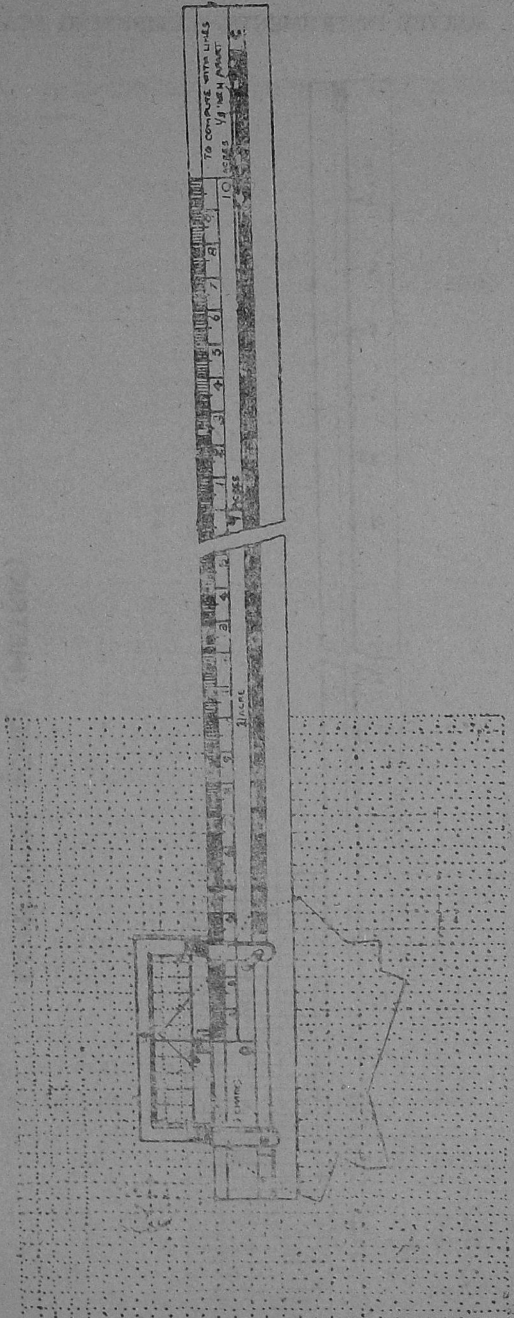
1. This is an instrument for obtaining from maps the areas of fields and other enclosures.

2. The computing scales used in the Tamil Nadu Survey are graduated to suit the scale on which the maps are drawn, viz., 16 inches = 1 mile, or 5 chains to 1 inch. and read to acres and cents.

3. The 16 inch computing scale, which is graduated to a length of 20 inches, reads 10 acres in one sweep and that graduated to a length of 10 inches reads 5 acres in one sweep. Each main division on this scale denotes 1 acre, each minor division one-tenth of an acre or 10 cents and each subdivision one hundredth of an acre or 1 cent.



COMPUTING SCALE (METRIC)



COMPUTING SCALE

4. There is also the 1 inch = 2 chains, or 40 inch computing scale which is graduated to a length of 20 inches and reads 2 acres in one sweep. Each main division on this scale represents 10 cents, each minor division 1 cent and each subdivision .2 or $\frac{1}{5}$ of a cent.

5. Along the centre of each computing scale is an undercut groove, into which is fited, so as to move freely along it, a tongue or slide of brass or steel. To this slide is attached a projecting frame which passes over the slide of the scale and lies flat upon the paper on which the scale is placed when in use. A handle fixed to the slide enables it and the frame to be moved with facility along the graduated scale. The frame has a fine hair or platinum wire fixed across its centre at right angles to the scale.

6. To apply the computing scale to the measurement of areas there should be a piece of transparent paper with lines drawn on it, intersecting each other at right angles and forming squares.

7. In the area square paper to be used for computing areas from 16 inch maps, the lines should be one-fifth inch apart, each square representing 10 cents. In the paper to be used for 40 inch maps the lines should be one fourth inch apart each square representing 2 $\frac{1}{2}$ cents.

8. Most of the lines on the area square paper are in black, but for the sake of convenience, the first line and every tenth line from it are in red, and the sixth and every tenth line from it are in blue in the 16 inch area square paper. In the 40 inch area square paper, the first line and every eighth line from it are in red, and the fifth and every eighth line from it are in blue.

9. The area square paper should be placed on the map, as shown in the diagram on opposite page. It should be so placed that most of the lines on the map fall obliquely to the ruled lines on the tracing paper.

10. The slide should be set to zero and the instrument placed on one of the lines A, so that the hair fixed to the frame may equalize the left side of the upper portion of the field falling within two of the lines a, b on the area square paper. The slide should then be moved until the hair equalizes that portion of the right side with in the same horizontal lines. The slides remaining fixed in position, the scale should be moved down wards to the next line B until hair coincides with or compensates the left-hand boundary as before. The coincidence or compensation being established, the

sliding frame should be moved to bring the hair to coincide with or compensate the right-hand boundary. This process should be repeated until the slides has passed over the succeeding lines on the area square paper for the remaining portion of the field.

11. If the area of the field be less than that represented by the entire length of the scale the division opposite the hair will indicate the area of the field in acres and cents (hectares and half ares). If the area be more, as soon as the slider reaches the end of the scale a mark should be made on the area square paper lightly in pencil, just below the hair. The scale should then be removed. Re-adjusting the slide to zero, the scale should be placed over the area square paper so that the hair coincides with the pencil mark already made. The process described above should be repeated until the entire area of the field is obtained.

12. In computing the area of offsets those on that side of the chainline are scaled first which appear to be of the greatest area, and those on the other side are then scaled backwards without shifting the slide back to zero. The object of working the slide in the reverse way is to obtain the difference of area between the offsets and insets ; and this difference is entered in the area list, as plus or minus according as the area of offsets outside or inside the chain line is the greater.

13. Care must be taken to see that the area square paper does not slip during the process of computation of the area of any field. This is best secured by placing a weight over the area square paper in such a position as not to interfere with the movement of the scale.

14. The area square paper is apt to expand or contract according to the temperature. A set of standard ruled lines should, therefore, be kept on card board with which the paper should be compared every day, both before and after work. The paper should on no account be folded or rolled.

15. The computing scale and area square paper intended for use on the 16 inch map should not, as a rule be used on the 40 inch map and vice versa. But when they are so used and when areas have to be computed from maps plotted on other than the scale of 16 inches

or 40 inches to the mile, the area read off the computing scale should be multiplied by the square of the proportion of the scales in order to obtain the true area.

Thus, if the area obtained by using the 16 inches computing scale and area square paper on a 40 inch map be 9·50 acres, the true area will be $9{\cdot}50 \times \left(\frac{16}{40}\right)^2 = 9{\cdot}50 \times \left(\frac{2}{5}\right)^2 = 9{\cdot}50 \times \left(\frac{2}{5}\right)^2 = 9{\cdot}50 \times \frac{4}{25} = 9{\cdot}50 \times {\cdot}16 = 1{\cdot}52$ acres.

If the area of a map plotted on scale 1 inch = 1 mile be computed with the 16 inch computing scale and the area read off is found to be 6·20 acres, and the true area will be $6{\cdot}20 \times \left(\frac{16}{1}\right)^2 = 6{\cdot}20 \times 256 = 1{,}587{\cdot}20$ acres ; or $6{\cdot}20 \times \frac{16 \times 16}{640} = 6{\cdot}20 \times \frac{2}{5} = 6{\cdot}20 \times {\cdot}4$ or 2·48 square miles.

DESCRIPTION OF THE COMPUTING SCALE IN THE METRIC SYSTEM.

Only one type of computing scale will be used for both cadastral and Town Surveys. The scale about 50 centimetres in length comprises of 5 main divisions. 50 minor divisions and 1,000 subdivisions. On a plot and area square paper drawn to scale 1 m.m. : 500 m.m. each subdivision will read $1\frac{1}{4}$ square metres, each minor division 25 square metres, each main division $2\frac{1}{2}$ ares and one full sweep, $12\frac{1}{2}$ ares. This scale can be used for all plottings on other scales also, the area being suitably calculated. For example, on the scale 1 m.m. : 1000 m.m. each subdivision will read 5 square metres, each minor division, 1 are (100 square metres) each main division, 10 ares and one full sweep 50 ares.

AREA SQUARE.

1. The area square is a transparent piece of paper or tracing cloth designed for obtaining areas from maps without the aid of the computing scale. The area square is generally used for taking areas on field maps plotted on scale, 1 inch 2 chains. On the area square are neatly drawn or printed in black, lines intersecting each other at right angles and forming square with sides of half an inch or one chain. Each square represents 10 cents and is divided into 10 rectangles by lines drawn or printed in red. Each rectangle represents one cent.

2. The area square is laid over the map so that the boundary of the field is clearly visible and the extreme west or east point of the field is at the corner of one of the ten-cent square (100 square metres). The area is then calculated from north to south by counting the number of squares and rectangle.

In counting the rectangles, half a rectangle or more should be reckoned as one cent (10 square metres) and less than half a rectangle rejected.

AREA SQUARE (METRIC SYSTEM).

3. Area square papers on scale 1 m.m. : 500 m.m. and 1 m m.: 1,000 m.m. will be used for the cadastral and Town surveys.

Area square papers on the scale 1 : 1,000 will contain 1 centimetre squares and each square will be divided into 10 equal parts. Each such part will read 10 square metres on the scale 1 m.m. = 1,000 m.m. and $2\frac{1}{2}$ square metres on the scale 1 m.m. = 500 m.m. In area square paper on the scale 1 m.m. : 500 m.m. each centimetre square will contain 25 equal parts, each part reading one square metre.

The Area square on scale 1 : 500 can be used for Town Surveys while that on the scale 1 : 1,000 can be used for cadastral Surveys.

CHAPTER XXV.

AIDS TO SURVEYING.

DEFINITIONS.

1. It is assumed that all surveyors have a knowledge of Elementary Geometry and have not forgotten the definitions of the simpler properties of lines and plane surfaces.

However a few definitions relating to Mensuration of Surfaces are given below besides the definition of the technical terms met with during the calculation involved in surveying.

(i) Mensuration is the art of measuring figures of every form, whether superficial or solid regular or irregular.

(ii) *Measures.*—Measures are of three kinds.
Linear, Square and solid

(iii) *Ordinary Linear Measures.*—The ordinary Linear Measures are the Millimetre, Centimetre, Decimetre, Dekametre, Hectometre, and Kilometre. The other measures are the squares or cubes of these.

(iv) *Area.*—Area means the superficial content of any plane Geometrical figure, estimated by the squares of some known Linear measures as Millimetres, Centimetres, Decimetres, etc.

(v) *Altitude.*—The altitude of any figure is the straight line drawn from its vertex perpendicular to its base.

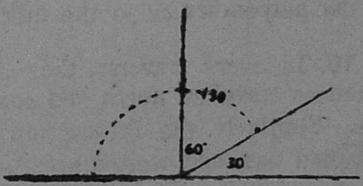
(vi) *Perimeter.*—Perimeter is the outer boundary of a figure or the sum of all its sides.

(vii) *Line.*—A line is a figure bounded by 2 arcs of circles.

(viii) *Ordinate.*—An ordinate is a straight line drawn from any point in a curve perpendicularly to another straight line called abscissa. The abscissa and ordinate together are called the Co-ordinates of the point.

2. **Compliment of an angle**.—The compliment of an angle is equal to its difference from 90° so that 60° is the complement of 30°.

3. **Supplement of an angle**.—The supplement of an angle is equal to its difference from 180° so that the supplement of 30° is 150°.



4. **Traverse.**—A traverse, as used in a survey sense, is the measurement of angles and distances along a circuitous route proceeding from one point on the earth's surface to another. If a traverse is made from any point, as station 1, to any other point, as station 12, it is called an unclosed traverse.

If, however, the traverse is continued by some other route 12, 13, 14 and back to station 1, it becomes a closed traverse.

When great precision is aimed at the linear measurements are made with a chain or steel tape, and the included angles are measured with a theodolite.

When rapid work is desired and when accuracy is not so important the angles may be measured with a circumferenter or prismatic compass, and the distance either chained or paced or taken by a perambulator or by time.

For a full explanation of the nature of a traverse and the method of computing it, see notes at the end of this Chapter.

5. The angles which the successive lines of a traverse form with the meridian are called the **bearings** and the lines themselves, the **distances.** Bearings are reckoned from the north at 0° by the east, south and west back to 360° or north.

6. **The true bearing** of a line is the angle made by the line with the true north.

7. The **magnetic bearing** of a line is the angle made by the line with the magnetic north. i.e., the direction which the north of the magnetic needle points to.

8. The difference in the position of successive stations of a line traverse, each one from the preceding, as reckoned due north and south on the meridian, is called the difference of **latitude.**

9. The difference in the position, as reckoned due east and west on the perpendicular to the meridian, is called the **departure**.

10. In every traverse, the distance on the meridian, i.e., the distances travelled north and south are called **northings** and **southings.** Similarly, the distances on the perpendicular, i.e., the distances travelled east and west are called **eastings and westings.**

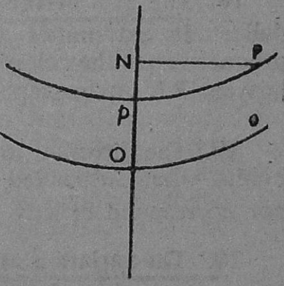
11. **The co-ordinates** of traverse are the meridional and perpendicular distances reckoned from the starting station, called the station of origin.

12. If the furthest eastern or western distance from the station of origin is not much, i.e., if the distance is not so great as to be affected by the curved shape of the earth's surface, the meridional and perpendicular distances are adopted. These are called the **rectangular co-ordinates.**

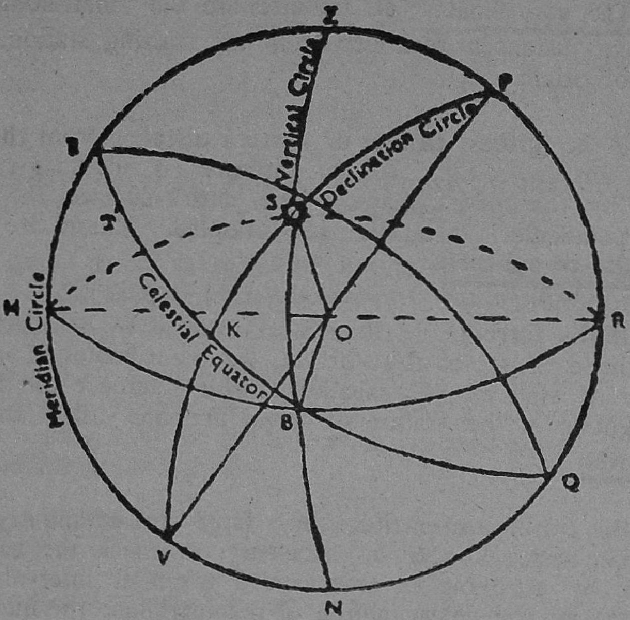
13. If the furthest distance is so great as to be affected by the curved shape of the earth's surface, the co-ordinates of latitude and longitude of stations are calculated with reference to the latitude and longitude of the station of origin and are called the **spherical co-ordinates.**

14. If a traverse is carried over a large tract of country extending several kilometres it becomes necessary to check the accuracy of the work by astronomical observations taken at intervals of about 50 stations for the determination of the meridian; the meridian thus observed is the true meridian at the station of observation. But, as the traverse system is based on the assumption that the earth is a plane, certain corrections must be applied to the observed meridian to make it parallel to the meridian of origin. This correction is called the **convergency of the meridian.** It is subtractive from the observed meridian when the observer is to the east of the meridian of origin and additive when the observation is taken to point to the west of the meridian of origin.

15. If *O* and *P* are two points on the surface of the earth and if the parallel through *P* cuts the meridian through *O* in *p*, and if a great, circle through *P* be drawn perpendicular to this meridian cutting it in *N* then *p N* is called the *Arc versine* of the arc *Pp*.



16. The diagram here illustrates the definitions given below. The plane of the paper is supposed to correspond with the plane of the meridian.



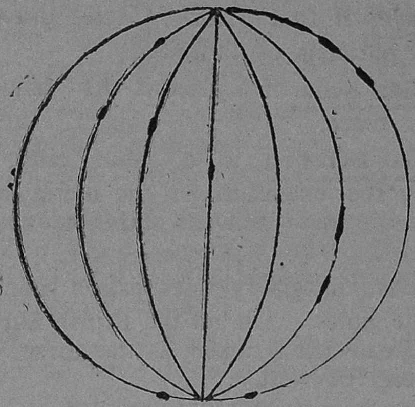
17. Celestial sphere. In the same way as circles are made use of as a means of measuring angles, so in spherical trigonometry a sphere is employed. Therefore we may conceive the concave bow of the heavens as a measuring sphere, with the earth at the centre. This sphere is called the celestial sphere and its diameter may be of any size, see figure above paragraph 17.

18. The axis of the earth is that diameter round which it rotates daily. Its extremities are called North and South Poles. This axis produced cuts the celestial sphere in the North and South Poles of the heavens-P.V., paragraph 16.

19. The direction to which the north point of the magnetic needle points, when suspended freely, is called the magnetic pole and does not correspond exactly to the north pole.

20. The variation of the magnetic needle is the angle which the magnetic north makes with the true north at any point. In some countries the variation is considerable. In Tamil Nadu is about °1 east, that is to say the needle points. 1 ° **east of north Tamil Nadu.**

The longitude of any place is its distance, east or west of the Greenwich meridian. A number of other meridians called Lines of Longitude are drawn to fix accurately the positions of places east or west of the meridian of Greenwich. These meridians are numbered 1, 2, 3 etc upto 180 east or west of this line.



"The altitude of a heavenly body, as seen from the surface of the earth, is its apparent altitude; its true altitude is what it would be, if observed from the centre of the earth."

The difference between the apparent and true altitude of a heavenly body is termed its parallax.

The parallax is greatest at the horizon and gradually diminishes as the body rises above the horizon until it comes to the zenith where the parallax vanishes. Hence the parallax should be added to the apparent altitude in order to obtain the true altitude.

"The rays of light from a heavenly body, on entering the atmosphere obliquely, are bent out of their course and incline downwards, towards the centre of the earth, making the object appear higher than it really is. The difference so caused between the true and apparent place of the object is called *its refraction.* The refraction is greatest when the object at the horizon, decreases in proportion to its altitude, and is nothing when it is in the zenith. Refraction must always be subtracted from its apparent or observed altitude".

21. The terrestial Equator is a great circle of the earth whose plane passing through the centre is perpendicular to the axis. This plane produced cuts the celestial sphere in the celestial equator. The terrestial and celestial equators are in the same plane, referred to generally as the plane of the equator. EKQ, paragraph 16:

22. **The Zenith** is the point in the celestial sphere vertically above the observer's position. Z. paragraph 16.

23 **The Horizon** is a plane cutting the celestial sphere at 90 ° from the zenith. HBR, paragraph 16.

24. The distance of any place north or south of the equator is called the **latitude** of that place. Circles drawn parallel to the equator are called parallels of latitude.

25. **The meridian plane** of a place is the plane passing through the poles and that place.

26. **The celestial meredian** is a great circle formed in the celestial sphere by the extension of the meridian plane. It passes through the poles of the heavens and the zenith. H Z P R N, paragraph 16.

27. **Meridians** are imaginary lines drawn round the earth and passing through the poles. In all the British Surveys the meridian passing through Greenwich is taken as the origin and distances are reckoned from it east or west.

28. **The altitude** of a heavenly body is the arc of a great circle through the zenith and the heavenly body intercepted between that body and the horizon. S B., paragraph 16. It is clear that the angle SOB would also represent the altitude, and this angle can be observed with the theodolite.

29. **The zenith distance** is the complement of the altitude. ZS, paragraph 16. When computing a latitude, the meridional zenith distance should be used with a plus sign when the heavenly body is south of zenith and with a minus sign when it is north.

30. **The azimuth** of a heavenly body is the angle between the meridian plane of the observer, and the vertical plane passing through the body. Azimuth is measured westwards from the meridian plane. PZS, paragraph 16.

31. **The declination** of a heavenly body is the arc of a great circle through the poles and the body intercepted between the plane of the equator and the body. It is measured from the equator to the poles in degrees 0 to 90 and is termed North or South (+ or —) according as the body lies north or south of the equator. SK, paragraph 16.

The declination of the sun is given for every day in the year, and that of the principal stars for every 10th day of the year, in the Nautical Almanac.

32. **The Polar Distance** of a heavenly body is the complement of its declin ation and styed N, or S polar distance **NPD** or **SPD**, according as it is measured from the N or S pole. PS, paragraph 16.

33. **The Hour Angle** of a heavenly body is the angle at the pole between the meridian of a place and the declination circle passing through the body. SPZ, paragraph 16. It is usually measured westward from the meridian from 0° to 360°, 0 hour to 24 hours, one hour being equivalent to 15° of arc.

34. **Astronomical triangle.**—A heavenly body at any moment forms a triangle with the zenith and elevated pole the sides being arcs of the meridian, the vertical circle and the declination circle.

In the figures paragraph 16, the arc EZ is the latitude $\varnothing$ of the observer, hence PZ $=90-\phi$ or co-latitude. The side PS or polar distance is equal to 90 —declination (∂) and its value can always be found from the Nautical Almanac.

The side ZS or zenith distance is equal to 90 — altitude (h) and the altitude can be observed with the theodolite.

The angle at Z is the azimuth, that at P is the hour angle (t) and the angle at S is the parallactic angle.

Given any three of these, the others can be deduced.

35. When any point of the celestial sphere is on the meridian of the observer that instant is called the **transit** of the point over the meridian, or the **me idian passage and culmination**.

36. **A sidereal Day** is the interval of time between two successive (upper) transits of the first point of Aries, the true vernal equinox, over the same meridian. It is divided into 24 hours

37. **Right Ascension** of a heavenly body is the arc of the equator intercepted between the first point of Aries (r paragraph 16) and a declination circle through the body. YK, paragraph 16.

38. **Mean Time.**—The average length of all the solar days of the year is taken and used as the mean solar day. The difference between apparent (sun) and mean time is called the **Equation of time.**

Projection is the method by which terrestial meridans and parallels are represented on paper. Any definite system of drawing these meridians and parallels is a map projection.

A graticule is the net work of lines drawn on every small scale map, which as a rule should be bounded by longitudes and latitudes. The object of the graticule is to identify the positions and to enable new points to be plotted.

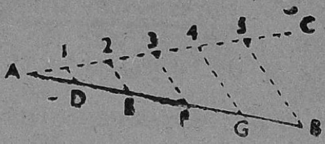
PROBLEMS.

Problem No. 1.

To divide a given straight line into any number of equal parts.

Let *A B* be the line which is required to be divided into five equal parts.

First method.—Draw the line *AC* making an acute angle with *AB*.



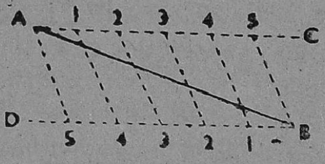
From A set off on *AC* points 1, 2, 3, 4 and 5 at equal distances.

Join 5 *B*; and through the points 4, 3, 2 and 1 draw lines parallel to 5*B*, cutting the given line at *G*, *F*, *E* and *D* respectively.

Then *AB* is divided into five equal parts at the points *D*, *E*, *F* and *G*.

Second method.—Having drawn the line *AC* and set off on it the points 1, 2, 3, 4 and 5 at equal distances, as above, draw the line *BD* parallel to *AC*.

Set off on *BD* points 1, 2, 3, 4 and 5 at the same equal distances as on *AC*.



Draw straight lines from *A* to 5, 1 to 4, 2 to 3, 3 to 2, 4 to 1 and 5 to *B*.

Then, these lines, where they cut *AB*, divide it into five equal parts.

Problem No. 2.

To construct a triangle equal to a given quadrilateral.

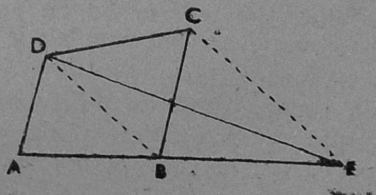
Let it be required to construct a triangle equal in area to *ABCD*.

Draw the diagonal *DB*.

Draw *CE* parallel to *DB* and meeting *AB* produced at *E*.

Join *DE*.

Then the triangle *AED* is equal to the given quadrilateral *ABCD*.



Problem No. 3.

To construct a triangle equal in area to a given Polygon.

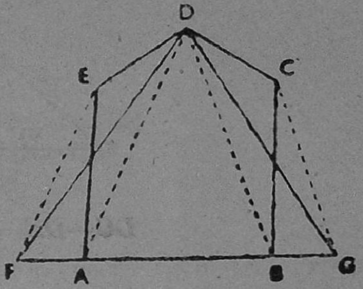
Let it be required to construct a triangle equal in area to *ABCDE*.

Draw the diagonals *DA* and *DB*.

Draw the lines *EF* and *CG* parallel to *DA* and *DB* respectively and meeting *AB* produced both ways at *F* and *G*.

Join *DF* and *DG*.

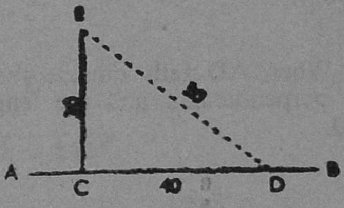
Then the triangle *DFG* is equal to the given polygon *ABCDE*.



Problem No. 4.

To lay off on the ground with the chain only a line at right angles to a given line from a given point in it.

Let AB be the line and C the point.



From C lay off CD, (40 links), along the line AB.

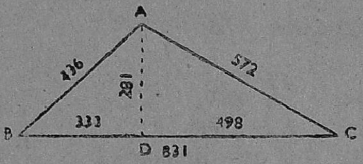
Then, holding one end of the chain at C and the index mark for 80 at D, pass an arrow through the ring at the index mark 30, and pull out these 80 links of the chain to E, so that CE and DE may form two straight lines.

Because, $CD = 40$, $CE = 30$, $ED = 50$ and $50^2 = 40^2 + 30^2$ therefore *ECD* is a right angled triangle of which *ED* is the hypotenuse and *ECD* the right angle. (Theor.)

Problem No. 5.

To find the length of the perpendicular from the apex of a triangle to the base and the lengths of the segments into which the base is divided.

First case.



$$DC - DB = \frac{AC^2 - AB^2}{DC + DB}$$

$$= \frac{(AC + AB)(AC - AB)}{BC}$$

$$= \frac{(572 + 436)(572 - 436)}{831}$$

$$= \frac{137088}{831}$$

$DC - DB = 165$

$DC + DB = 831$

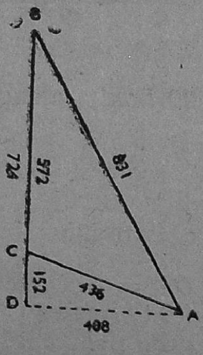
$DC = 498$

$AD^2 = AC^2 - DC^2$

$= 572^2 - 498^2$

$AD = 281.$

Second case.—When AD falls outside the triangle ABC to find the length of the perpendicular and the length to which the base is to be produced.



$$BD+DC=\frac{AB^2-AC^2}{BD-DC}=\frac{(AB+AC)\ (AB-AC)}{BD-DC}$$

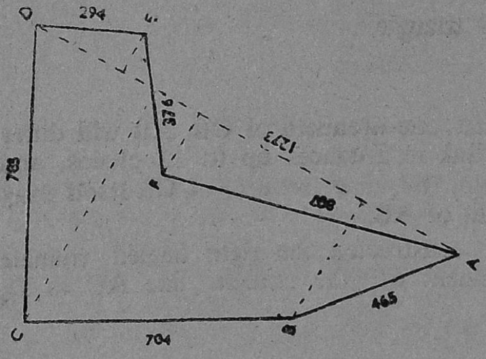
$$=(\text{Present case})\ \frac{(831+436)\ \ (831-436)}{572}$$

$$=\frac{500465}{572}=\text{say } 875$$

$$BD+DC=875$$
$$BD-DC=572$$
$$BD=723{\cdot}5 \text{ say } 724$$
$$AD^2=AC^2-CD^2$$
$$AD=408.$$

Problem No. 6.

To calculate the lengths of lines on the perimeter of a field by the chain and offset measurements taken on the diagonal lines crossing the field.



		D		
		1273		
		1002	114	E
C	698	913		
F	192	784		
B	358	297		
		A		

$$AB=\sqrt{358^2+297^2}\qquad =465$$

$$BC=\sqrt{(698^2-358^2)+(913-297)^2}\qquad =704$$

$$CD=\sqrt{698^2+(1273-913)^2}\qquad =785$$

$$DE=\sqrt{(1273-1002)^2+114^2}\qquad =294$$

$$EF=\sqrt{(1002-784)^2+(114+192)^2}\qquad =376$$

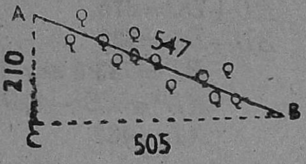
$$FA=\sqrt{(784^2+192^2)}\qquad =807$$

Problem No. 7.

To measure a line impeded by an object obstructing the sight.

Let AB be the line the measurement of which is obstructed by a row of trees.

First method.—As near as possible to A, select a point C from which A and B are visible and straight lines can be measured to them.



By means of the cross-staff, offset the point A on the line CB, i.e., erect the perpendicular CA, shifting the point C as may be necessary.

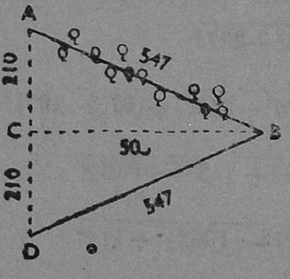
Measure √ AC and CB

ABC being a right-angled triangle.

$$AB = \sqrt{AC^2 + CB^2}$$

Note—when AC is less than one-twentieth of CB, AB will differ from CB by only about one link in distances up to 12 chains, and the difference being negligible, the measurement of CB itself may in such a case be taken as that of AB.

Second method.—Having constructed the right angled triangle ACB, continue the measurement of the straight line AC to D, until CD is equal to AC.



Measure DB.

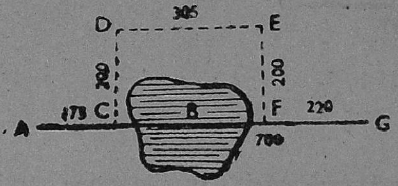
Then DB is equal to AB.

Problem No. 8.

To measure a line impeded by an object not obstructing the sight.

Let AG be the line the measurement of which is impeded by the pond B.

First method.—Measure AC in the direction of AG, and at or near the edge of the pond set up the cross-staff and lay off the line CD at Right angles to AC.



Measure in the direction of CD so that the line DE, measured at right angles to CD, may pass clear of the pond.

Set up the cross-staff at D and lay off the line DE at right angles to CD and measure as far as E so that EF measured at right angles to DE may pass clear of the pond.

At the point E set up the cross-staff and lay off the line EF, so that it shall be exactly equal to DC.

F will be in the straight line ACG.

Now, because EF is equal and parallel to DC, distance CF is equal to DE.

Measure FG.

Then AC+DE+FG=AG, the measurement required.

Second method.—Choose any point C from which straight lines can be measured to both A and G.

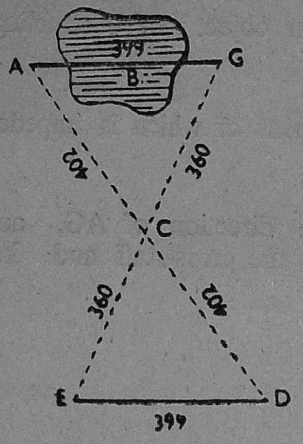


Fig. 1

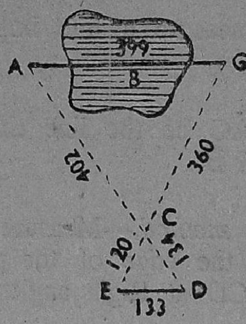


Fig. 2

Measure AC and prolong it in the same straight line to D making CD equal to AC (Fig. 1).

Do the same with GC, making CE equal to GC.

Then ED is equal to AG.

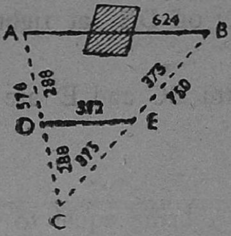
Note.--It is not absolutely necessary to make CD and CE equal to AC and GC respectively. It will be sufficient if CE is made to bear the same ratio to GC as CD bears to AC (Fig. 2).

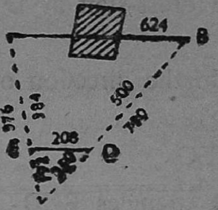
Thus, if AC and GC are 402 and 360 respectively and CD is, say 134 or $\frac{1}{3}$rd of AC, CE should be $\frac{1}{3}$rd of GC (360) i.e. 120.

Now because the triangles ACG and DCE are equiangular therefore, ED will be $\frac{1}{3}$rd of AG, i.e., AG is equal to 3 ED.

Problem No. 9.

To measure a line obstructed by a house, etc.—Let AB be the line the measurement of which is obstructed by a house.





Select a point C so that A and B are visible and lines CA and CB can be measured.

Measure CA and CB and mark off in them points D and E, so that CA and CB are the same multiples of CD and CE; that is, if CD is $\frac{1}{2}$ of CA, then CE should be $\frac{1}{2}$ of CB, or, if CD is $\frac{1}{3}$rd of CA, then CE should be $\frac{1}{3}$rd of CB. Measure the line DE

Now, ACB and DCE being equiangular, when $CD=\frac{1}{2}\ CA$, $DE=\frac{1}{2}\ AB$, i.e., $AB = 2\ DE$. When $CD = \frac{1}{3}\ CA$, $DE = \frac{1}{3}\ AB$, i.e., $AB = 3\ DE$.

Problem No. 10.

To measure a line across a river. Let AB be the line required to be measured. Set up the cross-staff at A and lay off AC at right angles to AB (Fig. 1).

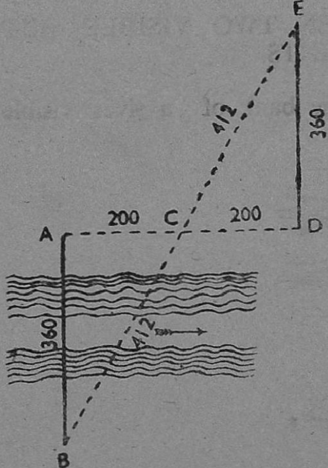


Fig. 1

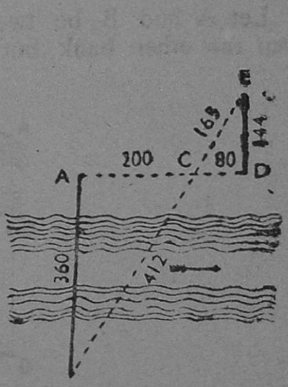


Fig. 2

42–29—18

Measure AC, say 2 or 3 chains, taking care to see that B is visible from C.

Continue the measurement in a straight line to D, making CD equal to AC

Set up the cross-staff at D and lay off DE at right angles to the lines ACD.

Measure in the direction of E, until BC and E are all in one straight line.

Measure EC.

Then, the triangles ECD and BCA being equal to each other, DE is equal to AB, the line across the river.

Note.—CD need not necessarily be made equal to AC.

Let AC be 200 links and CD 80 links (Fig. 2).

Then, the triangles ECD and BCA being equiangular, and consequently similar, AB can be calculated from the following proportion.

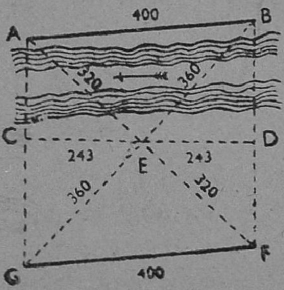
$$AB : DE :: AC : CD$$

$$AB = \frac{DE \times AC}{CD} = \frac{144 \times 200}{80} \text{ or } 360.$$

Problem No. 11

TO FIND THE DISTANCE BETWEEN TWO VISIBLE BUT INACCESSIBLE POINTS.

Let A and B be two points on one bank of a river visible from the other bank but not accessible.



Measure any line along the near bank and mark there on by the cross-staff, the points C and D such that CA and DB may be at right angles to CD.

Mark off E, the middle point of the line CD.

Measure CG and EG in the direction of AC and BE respectively until they meet at G.

Measure off EF and DF in the direction of AE and BD respectively until they meet at F.

Measure GF and it will be equal to AB.

Proof.—In the triangles ECG and EDB the angles ECG and GEC being respectively equal to the angles EDB and BED and the side, EC being equal to the ED, the side GE is equal to BE.

Similarly, in the triangles ACE and FDE, the side EA is equal to EF.

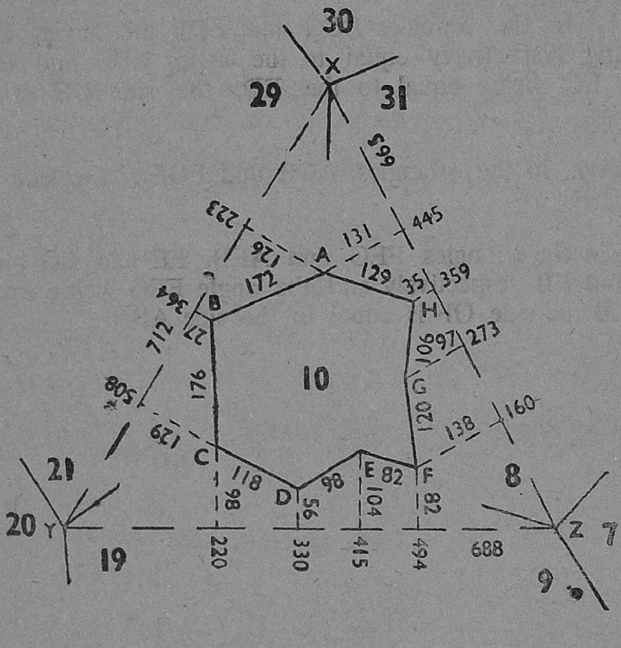
Now, in the triangles FEG and AEB, FE and EG being equal to AE and EB respectively and the angle FEG being equal to the angle AEB the side GF is equal to the side AB.

Problem No. 12.

To survey a small field covered with prickly-pear and unsuited for chain triangulation.

Let ABCDEFGH be field to be surveyed.

First method.—By forming a triangle round the field.

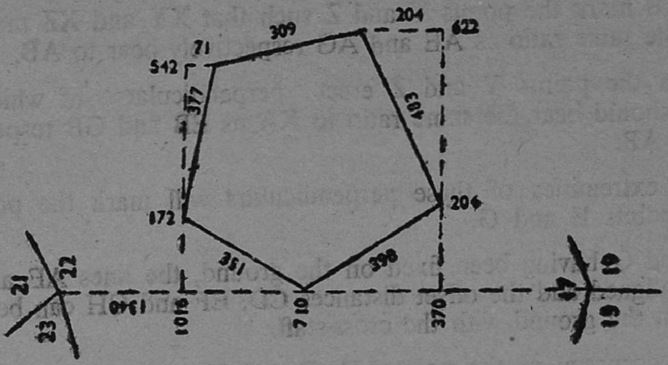


Form a triangle XYZ outside the field.

Take offsets from the sides of the triangle to the field bends.

NOTE.—To facilitate the plotting of the village map, the points K, Y, Z should if possible, be field trijunctions. Where this is not possible, the points selected should be field bends and they should each be connected by not less than three tie lines from the nearest field trijunctions.

Second method.—Run a line between two field trijunctions and offset the bends of the field in question.

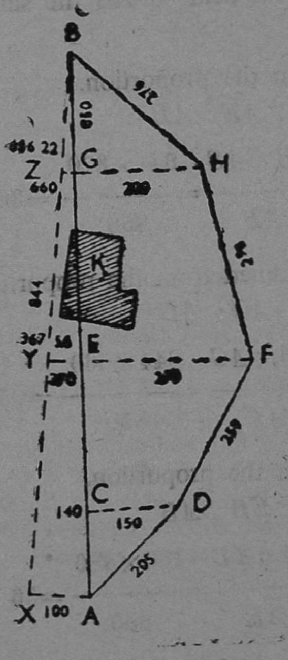


Problem No. 13.

Offsets having once been measured on a line to relay them on the ground when the line becomes obstructed and the stones to which the offsets were taken are also missing.

Let CD, EF and GH be the offsets to be relaid on the ground.

First method.—Select any point X so that A and B may be visible from it and the lines XA and XB can be measured.



On BX or BX produced, offset the point A and measure AX and XB.

In XB mark the points Y and Z such that XY and XZ may bear to XB the same ratio as AE and AG respectively bear to AB.

From the points Y and Z erect perpendiculars of which the lengths should bear the same ratio to XA as EB and GB respectively bear to AB.

The extremities of these perpendiculars will mark the positions of the points E and G.

E and G having been fixed on the ground, the lines AE and BG can be aligned and the offset distances CD, EF and GH can be easily relaid on the ground with the cross-staff.

The accuracy of the points, D, F and H should be checked by the recorded measurements of the lines AD, DF, FH and HB.

Supposing it is given that:—

$AB = 850,\ XB = 844,\ XA = 100.$

$AC = 140,\ AE = 370,\ AG = 660.$

$CD = 150,\ EF = 270,\ GH = 200.$

XY, XZ, YE and ZG are calculated as follows:—

Because, XY should bear to XB the same ratio as AE bears to AB.

XY is obtained from the proportion.

$$XY : XB :: AE : AB$$

$$XY = \frac{XB \times AE}{AB} = \frac{844 \times 370}{850} = 367$$

Similarly, XZ is obtained from the proportion.

$$XZ : XB :: AG : AB$$

$$XZ = \frac{XB \times AG}{AB} = \frac{844 \times 660}{850} = 655$$

YE is obtained from the proportion.

$$YE : XA :: EB : AB$$

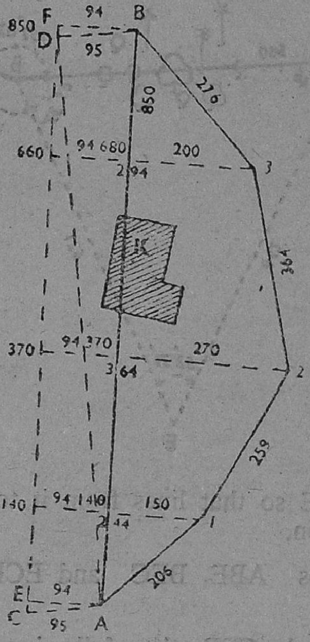
$$YE = \frac{XA \times EB}{AB} = \frac{100 \times 480}{850} = 56$$

Similarly, ZG is obtained from the proportion.

$$ZG : XA :: GB : AB$$

$$ZG = \frac{XA \times GB}{AB} = \frac{100 \times 190}{850} = 22$$

Second method.



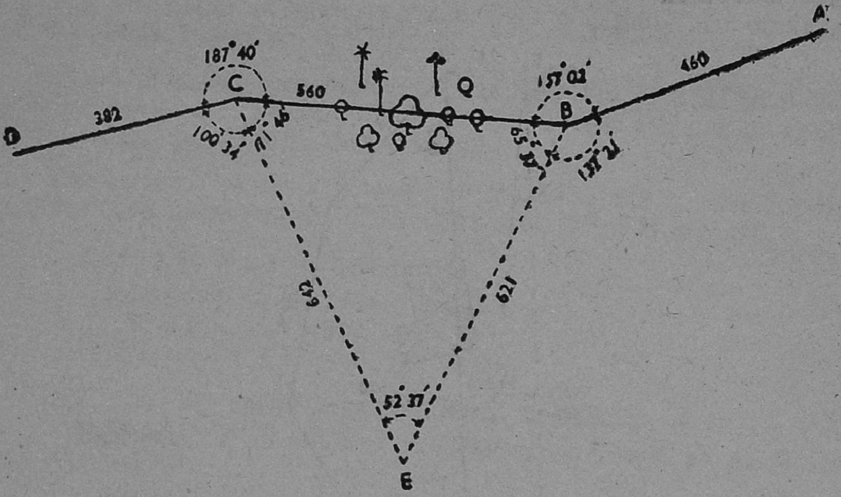
AB is the obstructed line. Find a point D visible from B and A so that BDA is a right angle, measure BD, 95 links and fix a flag at D. Go to A, form the right angle DAC and measure AC 95 links equal to BD. CD will be parallel to AB. Measure from C in the direction D, offset A from E, 94 links and place a flag at E. Start the chain against E and offset points 1, 2, 3 and B. EF will be equal to AB and the main line distance and EF offsetting points, 1, 2 and 3 will be the same as if the offsets had been taken on AB. The offset distances to points on this side AB will be 94 minus the actual offset distances measured from EF, while on the other side of AB, they will be the actual distances measured minus 94.

Problem No. 14.

To survey with theodolite a line that is obstructed.

The easiest way of doing this is by interpolating a station as explained below.

Let the line from B to C be obstructed.



Select any point E so that lines from it to B and C may pass clear of the obstruction.

Observe the angles ABE, BEC and ECD measure the lines BE and EC.

Now, in the triangle CEB, the following three elements are known:—

(1) Side BE.

(2) Side EC.

(3) Angle CEB—60 ° —observed angle BEC.

The remaining three elements: viz.—

(1) Side BC.

(2) Angle EBC.

(3) Angle BCE.

Can be calculated by Solution No. 9.

Then, $ABE+EBC=ABC$

and $ECD+BCE=BCD$.

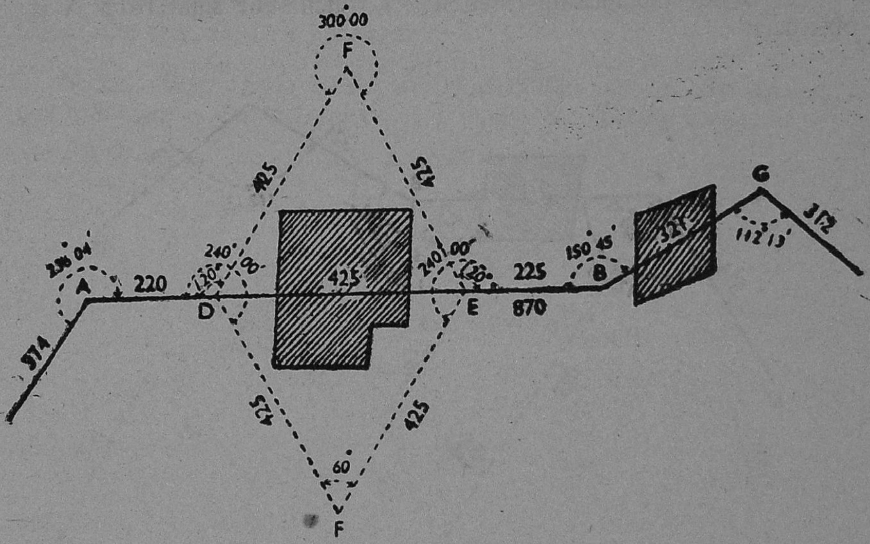
Problem No. 15.

To refix a missing theodolite station, of which the sight from its adjacent stations is obstructed, by forming an equilateral triangle.

Let B be the missing station of which the sight from A and G is obstructed.

Lay out the angle CAB and measure as far as D in the direction of AB.

At the point D, lay out the angle of 120 degrees if you would turn to the left, or of 240 degrees if you would turn to the right of the line AD.



Measure in the direction of the line indicated by the angle until you reach any point F which will be clear of the obstruction.

Note the distance DF.

At the point F, lay out an angle of 300 degrees if F is to the left, or of 60 degrees if F is to the right of AD, and measure along the line indicated by the angle until FE is equal to DF.

Then DFE will be an equilateral Triangle. DE will be equal to DF or FE and the point E will be in the line AB.

At the point E, lay out the angle FEB equal to 120 degrees or 240 degrees as the case may be, and measure in that direction a distance equal to AB.—(AD+DE).

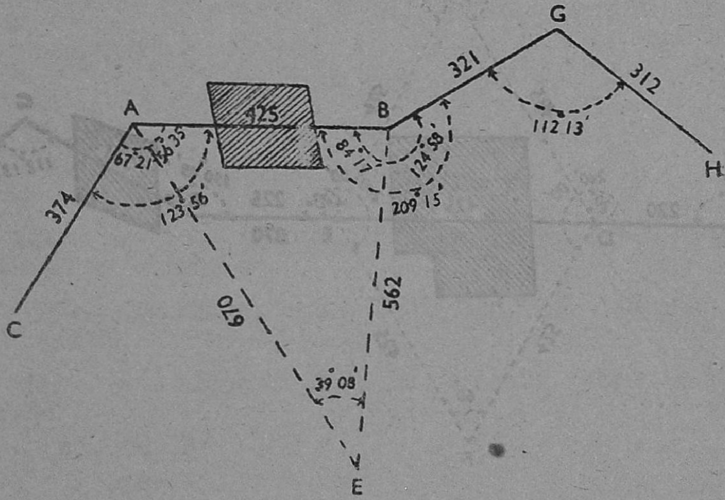
B will be the position at which the theodolite station should be refixed.

Repeat the above process in respect of the line BG and if the measurements lead to the point G, station B will have been correctly refixed with reference to the recorded angles and distances.

Problem No. 16.

To refix a missing theodolite station, of which the sight is obstructed by forming an oblique-angled triangle.

Let B be the missing station of which the sight from A is obstructed.



Select a point E from which A and B are visible and can be measured.

Observe the angle EAC and measure AE.

Now, in the triangle AEB, the following three elements are known:—

(1) Side AB.

(2) Side EA.

(3) Angle BAE = BAC—Observed angle EAC.

The remaining three elements, viz,

(1) Angle AEB.

(2) Angle EBA.

(3) Side EB.

can be calculated by solution No. 9.

From E lay off the computed angle AEB and measure the computed distance EB in that direction.

The point B will be the position of the missing station.

The accuracy of the work should be checked.

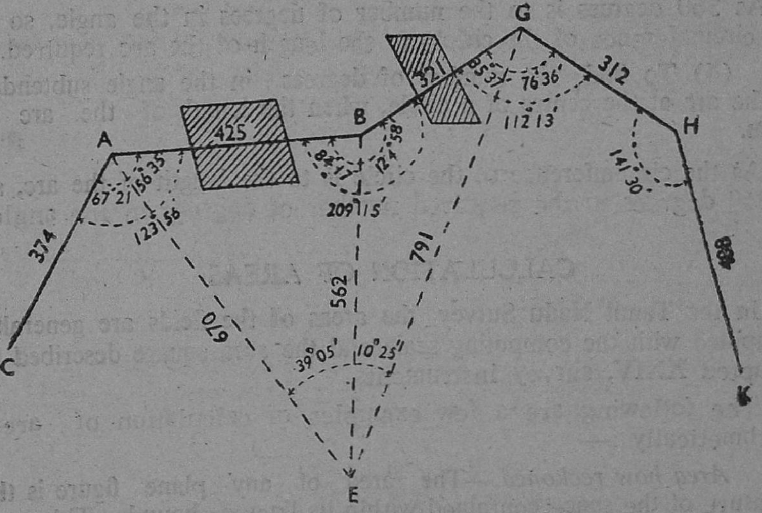
(1) By observing the angle GBE.

(2) Seeing whether the angle GBE and the computed angle EBA are together equal to the recorded angle GBA, and

(3) Whether the angle HGB and the distance GB agree with the recorded angle and distance.

NOTE.—Where two consecutive theodolite stations are missing, the following is the method to be adopted for refixing them:—

Let B and G be the two missing stations.



Refix the station G by means of the recorded angle KHG and the distance HG.

Then refix the station B by forming the triangle GEB as explained above.

To check the accuracy of the points G and B, observe the angles EAC and AEB and measure the side AE. Solve the triangle AEB by Solution No. 9 and see that

(1) the observed angle EAC + the computed angle BAE = the recorded angle BAC.

(2) the computed angles GBE and EBA = the recorded angle GBA, and

(3) the computed distance BA = its recorded distance.

The chief point to be borne in mind in selecting the point is that it is visible from G, B and A and that the lines GE, EB and EA can be measured.

To find the circumference of a circle, the diameter being given, multiply the diameter by 22 and divide the product by 7. To get the answer more accurately multiply the diameter by 3.141593.

To find the diameter of a circle, the circumference being given, multiply the circumference by 7 and divide the product by 22. For an accurate answer multiply the circumference by .318310.

To find the length of an arc of a circle when the number of degrees in the angle subtended by it at the centre of it is given.

As 360 degrees is to the number of degrees in the angle, so is the circumference of the cirlcle to the length of the arc required.

(4) To find the number of degrees in the angle subtended by the arc at the centre of a circle, when the length of the arc is given.

As the circumference of the circle is to the length of the arc, so is 360 degrees to the required number of degrees in the angle.

CALCULATION OF AREAS

In the Tamil Nadu Survey, the areas of the fields are generally computed with the computing scale and the area square described in Chapted XXIV, survey instruments.

The following are a few examples of calculation of areas arithmetically :—

Area how reckoned.—The area of any plane figure is the measure of the space contained within its lines or bounds. This area or content is estimated by the number of little squares that may be contained in the figure, the side or Metre or any other fixed quantity. And hence the area or content is said to be so many square Millimetres, square centimetres, etc., Thus if the figure to be measured be a rectangle A B C D and the little square E, whose side one centimetre be the measuring unit, then whatever number of those

little squares may be made to fit in to the figure, so many squares may be made to fit in to the figure, so many square centimetres it is said to contain which, in the present case, is 12.

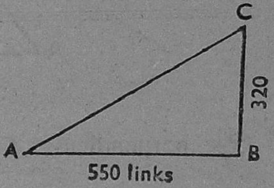
Case No. 1.

To find the area of a right-angled triangular field

Rule.—Multiply the two sides containing the right angle and divide the product by 2.

Let *ABC* be the field having the right angle at B.

$$\text{The area of the field} = \frac{AB \times BC}{2}$$
$$= \frac{550 \times 320}{2}$$
$$= 88{,}000 \text{ sq. links.}$$
$$= \cdot 88 \text{ acre.}$$
(0·3561 Hectares).



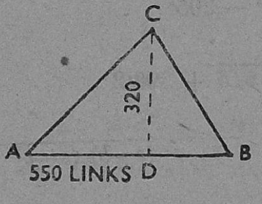
Each square metric link is .04 square metres in extent. Therefore 88,000 square metric links $= \frac{88000 \times 4}{100}$ square metres, i.e., 0.3561 Hectares.

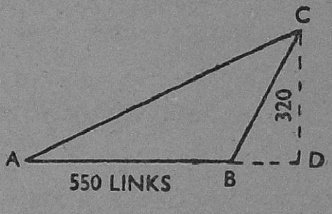
Case No. 2.

To find the area of any triangular field, when a perpendicular has been measured from any angle to the side opposite.

Rule.—Multiply the side by the perpendicular and divide the product by 2.

Let ABC be the field in which the offset DC has been measured.





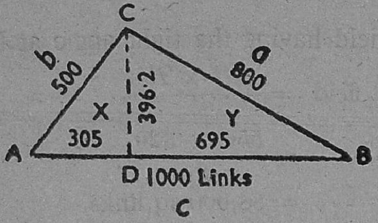
$$\text{The area of the field} = \frac{AB \times CD}{2}$$
$$= \frac{550 \times 320}{2}$$
$$= 88{,}000 \text{ sq. links.}$$
$$= \cdot 88 \text{ acre.}$$
(0·3561 Hectares).

Each square metric link is .04 square metres in extent. Therefore, 88,000 square metric links $= \frac{88000 \times 4}{100}$ square metres, i.e., 0.3561 Hectares.

Case No. 3.

To find the area of a triangular field, of which only the three sides have been measured, by calculating the perpendicular from any angle to the side opposite.

Let ABC be the field of which the sides BC, CA and AB measure 800, 500 and 1,000 links respectively.



The perpendicular CD is calculated as Below.

$$c \quad a + b :: a - b : \; y + x.$$

$$y - x = \frac{(a + b)(a - b)}{c}$$

$$= \frac{1,300 \times 300}{1,000} + 390.$$

$$y = \frac{1,000 + 390}{2} + 695$$

$$x = \frac{1,000 - 390}{2} + 305$$

$$CD = \sqrt{500^3 - 305^3}$$

$$= \sqrt{156,975} + 396{\cdot}2$$

$$\text{or } CD = \frac{2}{AB}\sqrt{s(s-a)(s-b)(s-c)}$$

$$= \frac{2}{1,000}\sqrt{1,150 \times 350 \times 650 \times 150}$$

$$= \frac{\sqrt{39,243,750,000}}{500} \text{ or } \frac{198,100{\cdot}3}{500}$$

$$= 396{\cdot}2$$

Now the area of the field $= \dfrac{AB \times CD}{2}$ or $\dfrac{1,000 \times 396{\cdot}2}{2}$

= 198,100 sq. links or 1·98 acres or (0·8017 hectares).

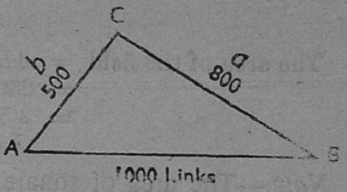
Case No. 4.

To find the area of a triangular field, of which only the three sides have been measured, without calculating the perpendicular.

Rule.—From half the sum of the three sides, subtract each side separately then multiply this half sum and the three remainders together. The squareroot of the product will be the area of the triangle.

Let ABC be the field of which the sides BC, CAand AB measure 800, 500 and 1,000 links respectively.

The area of the field
$= \sqrt{s\ (s-a)\ (s-b)\ (s-c)}$
$= \sqrt{1,150 \times 350 \times 650 \times 150}$
$= \sqrt{39,243,750,000}$
$= 198,100{\cdot}3$ square links.
$= 1{\cdot}98$ acres.



Note.—The area may be calculated by the use of logarithms thus:—

$$\sqrt{1,150 \times 350 \times 650 \times 150} = \frac{\log 1,150 + \log 350 + \log 650 + \log 150}{2}$$

log 1,150 = 3·0606978
log 350 = 2·5440680
log 650 = 2·8129134
log 150 = 2·1760913

2) 10·5937705

5·2968853
= 198,100·3 square links.
= 1·98 acres (0·8017 hectares).

Case No. 5.

To find the area of an equilateral triangular field.

Rule.—Multiply the square of one of its sides by $\frac{\sqrt{3}}{4}$.

Let ABC be the field with sides measuring 500 links each.

The area of the field $= AB^2 \times \frac{\sqrt{3}}{4}$

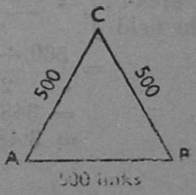
$= 500^2 \times \frac{\sqrt{3}}{4}$

$= \frac{250,000 \times 1{\cdot}73205}{4}$

$= \frac{433,012{\cdot}5}{4}$

$= 108,253{\cdot}1$ sq. links.

$= 1{\cdot}08$ acres (0·4371 hect.)

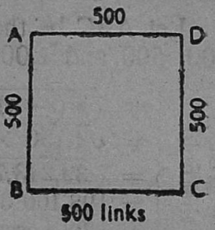


Case No. 6.

To find the area of a square field.

Rule.—The area is the square of one of its sides.

Let ABCD be the field with sides measuring 500 links each.



The area of the field $= AB^2$ or 500^2
$= 250{,}000$ sq. links.
$= 2{\cdot}50$ acres.
$(1{\cdot}0117$ hectares).

Note.—The area of square fields is also equal to half the square of the diagonal.

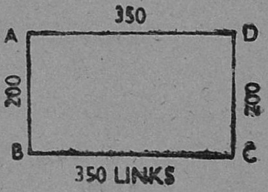
Case No. 7.

To find the area of a rectangular field.

Rule.—Multiply the length by the breadth.

Let ABCD be the field of which the sides measure 350 and 200 links, respectively.

The area of the field $= BC \times CD$, or $DA \times AB$
$= 350 \times 200$
$= 70{,}000$ sq. links.
$= {\cdot}70$ acre.
$(0{\cdot}2833$ hectares).



Case No. 8.

To find the area of a trapezium-shaped field.

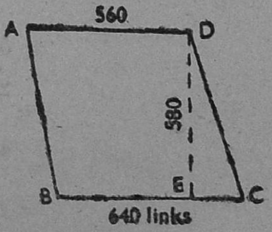
Rule.—Multiply half the sum of the parallel sides by the perpendicular distance between them.

Let ABCD be the field of which the parallel sides measure 560 and 640 links and the perpendicular distance between them measure 580 links.

$$\text{The area of the field} = \frac{AD + BC}{2} \times DE$$

$$= \frac{560 + 640}{2} \times 580, \text{ or } 600 \times 580$$

$= 348{,}000$ sq. links.
$= 3{\cdot}48$ acres $(1{\cdot}4083$ hectares).



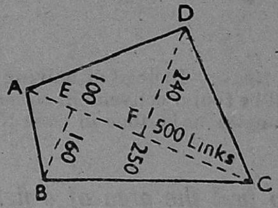
Case No. 9.

To find the area of any quadrilateral field, when two opposite corners have been offsetted on the diagonal drawn between the other two corners.

Rule.—Multiply the diagonal by half the sum of the offsets (perpendiculars).

Let ABCD be the field of which the corners B and D have been offsetted on AC

$$\text{The area of the field.} \left\{ \begin{aligned} &= AC \times \frac{EB + FD}{2} \\ &= 500 \times \frac{160 + 240}{2} \\ &= 500 \times 200 \\ &= 100{,}000 \text{ sq. links} \\ &= 1 \text{ acre.} \\ &\quad (\cdot 4047 \text{ hectares}). \end{aligned} \right.$$



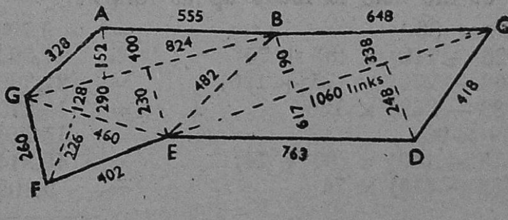
NOTE.—When the corners are not offsetted, the area of the quadrilateral *ABCD* is obtained by calculating the areas of the triangles *ABC* and *CDA*, by case No. 3 or 4 and taking their sum.

Case No. 10.

To find the area of a field containing more than four sides, when the field has been divided into a number of triangles and the bends have been offsetted from the sides of these triangles.

Rule.—Calculate the areas of the several quadrilaterals and triangles separately as explained above and take their sum.

Let GFEDCBA be the field which has been cut up into 5 triangles.



42-29--19

The area of the field is made up as follows:—

$$\text{Area of } EDCB = 1{,}060 \times \frac{248 + 190}{2} = 232{,}140 \text{ sq. links.}$$

$$\text{,, } GEBA = 824 \times \frac{230 + 152}{2} = 157{,}384 \text{ ,,}$$

$$\text{,, } GFE = \frac{460 \times 226}{2} = 51{,}980 \text{ ,,}$$

$$\text{Total} = 441{,}504 \text{ ,,}$$

$$= 4{\cdot}41 \text{ acres } (1{\cdot}7847 \text{ hectares}).$$

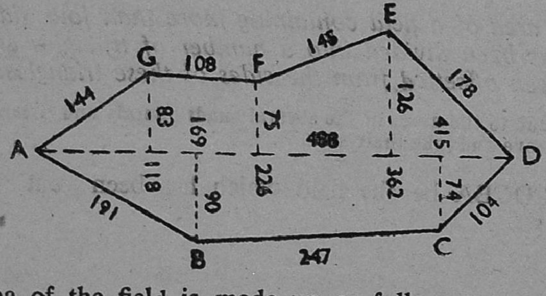
NOTE.—Instead of halving the product for each quadrilateral and triangle, it will be found convenient to halve the total product for all the quadrilaterals and triangles as is done in Case No. 11.

Case No. 11.

To find the area of a field containing more than four sides, when all the bends have been offsetted on a single line measured across the field.

Rule.—Find the areas of the triangles and the trapeziums, into which the field has been divided by the line measured across it and the offsets taken therefrom, and add the areas together.

Let ABCDEFG be the field in which all the bends have been offsetted on the line AD.



The area of the field is made up as follows:—

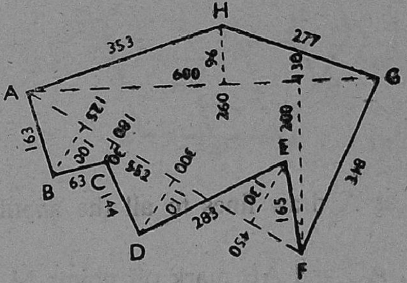
118 × 83	=	9,794	sq. links.
(226 — 118) × (83 + 75)	=	17,064	,,
(362 — 226) × (75 + 126)	=	27,336	,,
(488 — 362) × 126	=	15,270	,,
169 × 90	=	15,210	,,
(415 — 169) × (90 + 74)	=	40,344	,,
(488 — 415) × 74	=	5,402	,,
Total	=	131,026	,,
Half total	=	65,513	,,

= ·65 acre (0·2630 hectares).

Case No. 12.

To find the area of a field when a chain line crosses a side thus making the offsets taken to its two ends lie one on each side of the chain line.

Let ABCDEFGH be the field in which the chain line AF crosses the side DE, making the offset to D lie to the right of AF and that to E to the left of it.



The area of the field is equal to the area of the quadrilateral AFGH and the area of offsets on the chain line AF.

		+	−
Area of the quadrilateral	$AFGH = 600 \times \frac{290+96}{2} =$	115,800	
Area of offsets on the chain line *AF*. =	$\frac{125 \times 100}{2} =$	6,250	
	$(180-125) \times \frac{100+30}{2} =$	3,575	
	$(300-180) \times \frac{30+110}{2} =$	8,400	
	$(450-300) \times \frac{130-110}{2} =$		* 1,500
	$(552-450) \times \frac{130}{2} =$		6,630
		134,025	8,130

The area of the field = 134,025 — 8,130 or 125,895 sq. links.
= 1·26 acres (0·5099 hectares).

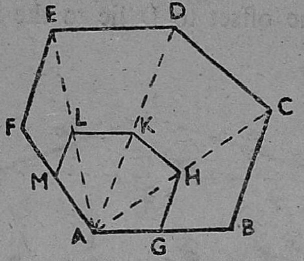
* Note.—If the offset distance taken to the bend *D* be 130 and that taken to the bend *E*, 110, the product 1,500 should be entered under the column +.

42-29—19A

Case No. 13.

To reduce or enlarge an irregular figure by the use of the plotting scale.

Let ABCDEF be the figure which is required to be reduced to say, half its scale.



From any point as A draw lines to all the angular points of the figure.

In AF, AE, AD, AC and AB mark off points M, L. K, H and G such that AM, AL, AK, AH and AG may be exactly half of AF, AE, AD, AC and AB respectively and join M, L, K, H and G.

Then AGHKLM will be on half the scale of ABCDEF.

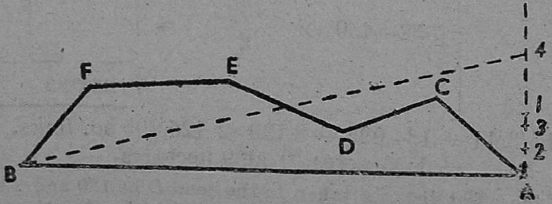
IF AGHKLM be the given figure and it is required to enlarge it to double its scale, then the lines AG, AH, AK, AL and AM should be produced to double their lengths.

The figure formed by joining the points BCDE and F will be on double the scale of AGHKLM.

Case No 14.

To reduce any irregular figure consisting of a number of sides to a triangle or quadrilateral of equal area.

Let ACDEFB be the irregular field.



Draw a pencil line AG making any angle, a right angle preferred, with the line AB.

Lay the parallel rule along the point A and the third angle, D, open the rule till it meets the second angle C and make the 1st mark on the line AG where the rule cuts it.

Lay the rule along the 1st mark on the line AG and the fourth angle E open the rule till it meets the third angle D and make the 2nd mark on the line AG where the rule cuts it.

With the second mark on the line AG and the fifth angle F, the parallel rule moved to the fourth angle E will give the 3rd mark on the line AG.

From this 3rd mark on the line AG and the sixth angle B, the parallel rule moved to the fifth angle F will give the 4th mark on the line AG.

Join the 4th mark on the line AG with B.

The triangle A4B will be equal in area to the figure ACDEFB.

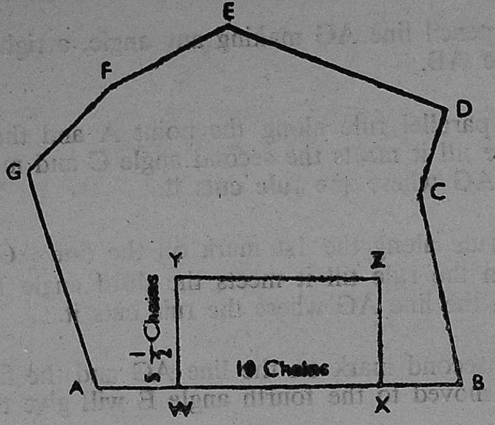
If 3F is joined, the quadrilateral A 3FB will be equal in area to the figure ACDEFB.

The above method is generally known as "casting" and will be found a convenient and expeditious method of calculating the area of offsets from a map.

Case No. 15.

To cut off from a given field, a portion containing a required area, with a part of the boundary of the given field as one of its sides.

Let it be required to cut off from ABCDEFG an extent of 2 Hectares with a part of AB as one of its sides. On the line AB, select two convenient points W and X and measure the distance between them, say, 10 chains. From W and X, lay off prependiculars, WY and XZ of equal length. The area of the required portion, in square metres, divided by the length, in metres, of the line WX will give the length of each of the perpendiculars.



Thus 2 Hectares (i.e.) 50 square chains 20,000 sq. metres divided by 10 chains or 200 metres will be 5 chains or 10 metres.

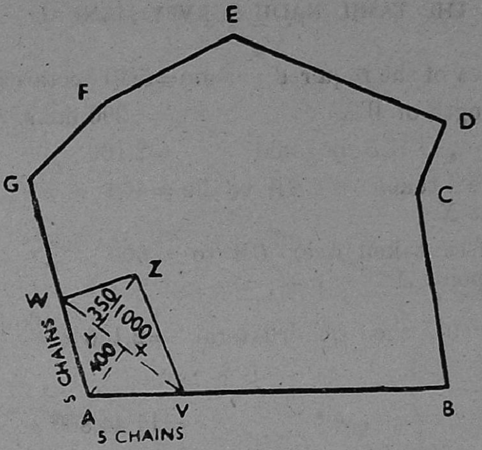
Then measure YZ and see that it is of the same length as WX i.e. 10 chains or 200 metres,. The rectangle WXYZ is the required portion measuring 2 Hectares cut off from the given field.

Case No. 16.

To cut off from a given field, a portion containing a required area, with parts of two adjoining boundaries of the given field as two of its sides.

Let it be required to cut off from ABCDEFG an extent of $1\frac{1}{2}$ Hectares with AV and AW parts of AB and AG, as two of its sides.

Extent required to be cut off $1\frac{1}{2}$ Hectares 37, 50,000 square links. From VW measure the offset XA and let it be 4 chains. The area of the triangle VAW $= \frac{1000 \times 400}{2}$ square links or 2,00,000 square links. Deduct this from the total area required i.e., 3,75,000 square links. The balance 1,75,000 square links will be the area of another triangle to be formed on the other side of line VW. The balance area i.e., 1,75,000 square links divided by half the length, in links, of the line VW will give the length of the offset to be laid off on the line VW, to form the other triangle. Thus 1,75,000 square links divided by 500 links will be 350 links, lay out the offset **YZ** equal to 350 links, from any convenient point in VW.



Measure WZ and VZ

Then AVZW is the required portion measuring 1 ½ Hectares cut off from the given field.

Case No. 17.

To cut off from a given field a portion containing a required area, with the whole of one boundary and parts of two boundary lines of the given field as three of its sides.

Let it be required to cut off from ABCDEFG a portion with AB, and BX and AW parts of BC and AG, as three of its sides.

First draw a straight line completing the quadrilateral WABX. Then find the area of the quadrilateral by chaining a diagonal and taking of two offsets.

If the area thus found of the quadrilateral is less than the area of the required portion, a triangle containing the deficiency must be added to the quadrilateral.

If the area of the quadrilateral is greater than the area of the required portion, a triangle containing the excess must be deducted from the quadrilateral.

In both cases, the required portion will have five sides. The figure shows the first case.

Let the area of the required portion = 5·40 hectares.

,, the length of WX = 1,900 links.

,, ,, WB diagonal = 2,160 ,,

,, the offset taken over BW to the point X. = 460 ,,

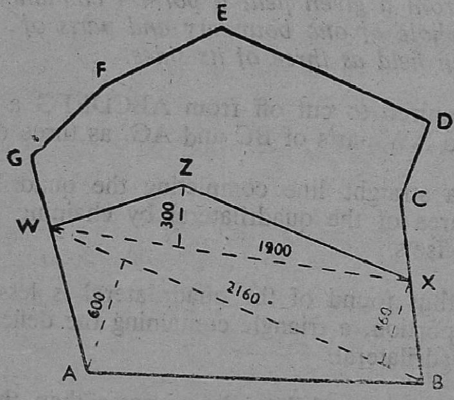
,, the offset taken over BW to the point A. = 600 ,,

The area of the quadrilateral $WABX$. $= 2{,}160 \times \frac{460+600}{2}$ sq. links.

= 11,44,800 sq. links.

Deduct the extent 11,44,800 square links from 5.40 Hectares or 13,50,000 square links. The balance 205,200 square links will be the area of the triangle WXZ which should be added to quadrilateral WABX.

In order to form the triangle, the length of the offset to Z is obtained by dividing 2,05,200 square links by half the length of WX i.e, 950 links.

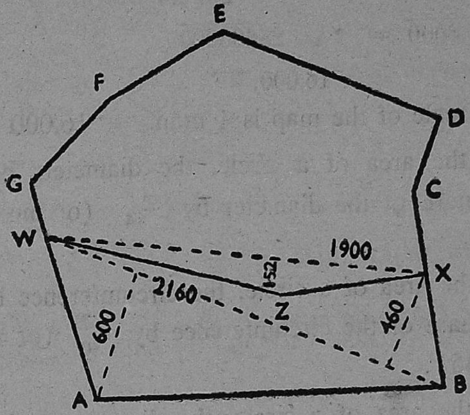


The quotient 300 links is the length of the offset to Z lay out the offset from any convenient point in XW.

Measure WZ and XZ.

Then ABXZW is the required portion measuring 5.40 Hectares cut off from the given field.

The following figure shows the second case, i.e., when the area of the quadrilateral WABX is greater than the area of the required portion:



Let the area of the required portion be 4.40 hectares the area of the quadrilateral WABX being 11,44,800 square links as shown in the previous case, the difference between this area and the area (4.40 Hectares or 11,00,000 square links) of the required portion is 44,800 square links.

The difference 44,800 square links, will be the area of the triangle WZX which should be deducted from the quadrilateral WABX.

In order to form the triangle, the length of the offset to, Z is obtained by dividing 44,800 square links by half the length of WX viz., 950 links.

The quotient 152 links is the length of the offset to Z lay out the offset from any convenient point in XW. Measure WZ and XZ.

Then ABXZW is the required portion measuring 4.40 hectares cut off from the given field.

Case No. 18.

To find the scale of a map whose area is given, but on which the scale is neither drawn nor mentioned.

Rule.—As the area of the map by any scale whatsoever is to the given area, so is the square of the assumed scale to the square of the scale by which the map was originally laid down. The square root of the latter will give the scale sought.

Let it be required to find the scale of the map of which the area is given as 811.84 hectares but in which the scale is omitted to be shown.

If the area computed on the map assuming its scale to be 1 m.m. : 8000 m.m. be 202.96 hectares then

$202{\cdot}96 : 811{\cdot}84 :: 8000 : 1$

$$\text{The required scale} = \sqrt{\frac{811{\cdot}84 \times 8000}{202{\cdot}96}}$$

$$\sqrt{4 \times 8000} = \sqrt{256000000}$$

$$= 16{,}000.$$

That is, the scale of the map is 1 m.m. = 16,000 m.m.

1. To find the area of a circle, the diameters being given :—Multiply the square of the diameter by $\frac{11}{14}$ (or more correctly by .785398).

2. To find the area of a circle, the circumference being given:—Multiply the square of the circumference by $\frac{7}{80}$ (or more correctly by . . . 079545).

3. To find the area of a circle, the diameter and circumference being given:—Multiply half the circumference by half the diameter.

4. To find the diameter of a circle the area being given:—Multiply the area by $\frac{14}{11}$ (or more correctly by 1.273240 and extract the square root of the product.)

5. To find the circumference the area being given:—Multiply the area by $\frac{88}{7}$ (or more correctly by 12.57143) and extract the square root of the product.

6. To find the lateral surface of the cylinder, multiply the radius and height of cylinder by 2π

7. To find the lateral surface of the cone:—Multiply the radius of the circle at the bottom by π and the height of the cone.

8. To find the area of the sector of a circle the length of the arc and radius being given:—Multiply half the length of the arc by the radius.

9. To find the area of the segment of a circle the area of the sector and area of the triangle formed by the chord of the segment and the radius of the circle being given:—Subtract the area of the triangle from the area of the sector.

SOLUTION OF TRIANGLES.

1. The trigonometrical ratios of an angle are certain relations which exist between any two sides of a right-angled triangle of which it is one of the angles.

2. The ratios are distinguished by special names and the six most important of them are:—

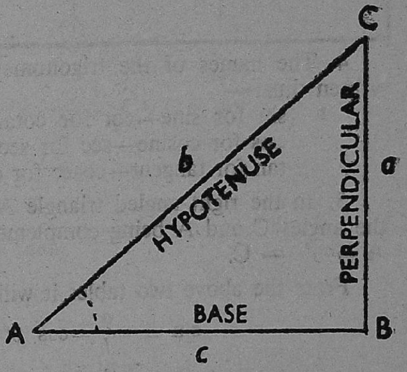
Sine,	Tangent,	Secant,
Cosine,	Cotangent,	Cosecant.

3. Let ABC be a right-angled triangle having the right angle at B.

Taking the acute angle at A, i.e., the angle CAB, the adjacent side AB is the base, and the opposite side BC is the perpendicular.

The following table shows the trigonometrical ratios of the angle CAB or A:—

Trigonometrical ratio.	Value.	Short symbol.
Sine A ..	$\frac{\text{Perpendicular}}{\text{Hypotenuse}}$	$\frac{a}{b}$*
Cosine A ..	$\frac{\text{Base}}{\text{Hypotenuse}}$	$\frac{c}{b}$
Tangent A..	$\frac{\text{Perpendicular}}{\text{Base}}$	$\frac{a}{c}$
Cotangent A.	$\frac{\text{Base}}{\text{Perpendicular}}$	$\frac{c}{a}$
Secant A ..	$\frac{\text{Hypotenuse}}{\text{Base}}$	$\frac{b}{c}$
Cosecant A.	$\frac{\text{Hypotenuse}}{\text{Perpendicular}}$	$\frac{b}{a}$

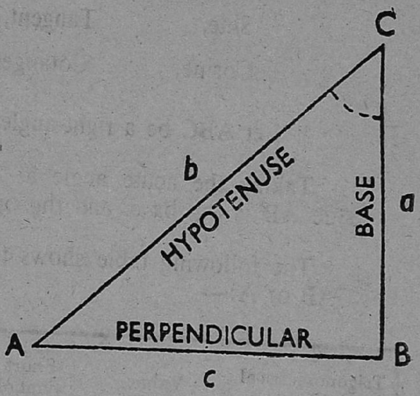


* It is usual, for the sake of convenience, to express the angle of a triangle by capital letters and the opposite sides by the corresponding small letters.

In the same right-angled triangle, taking the acute angle at **C, i.e.,** the angle BCA, the side AB becomes the perpendicular, and BC becomes the base.

The following table shows the trigonometrical ratios of the angle BCA or C:—

Trigonometrical ratio.	Value.	Short symbol.
Sine C ..	$\frac{\text{Perpendicular}}{\text{Hypotenuse}}$	$\frac{c}{b}$
Cosine C ..	$\frac{\text{Base}}{\text{Hypotenuse}}$	$\frac{a}{b}$
Tangent C ..	$\frac{\text{Perpendicular}}{\text{Base}}$	$\frac{c}{a}$
Cotangent C.	$\frac{\text{Base}}{\text{Perpendicular}}$	$\frac{a}{c}$
Secant C ..	$\frac{\text{Hypotenuse}}{\text{Base}}$	$\frac{b}{a}$
Cosecant C.	$\frac{\text{Hypotenuse}}{\text{Perpendicular}}$	$\frac{b}{c}$



4. The names of the trigonometrical ratios are abbreviated and written thus:—

sin for sine—cot for cotangent.
cos for cosine—sec for secant.
tan for tangent—cosec for cosecant.

5. In the right angled triangle ABC, referred to in rule 3 above, the angles C and A being complementary, $C = 90° - A$ and $A = 90° - C$.

From the above two tables it will be seen that:—

$$\sin A = \frac{a}{b} = \cos (90° - A)$$

$$\cos A = \frac{c}{b} = \sin (90° - A)$$

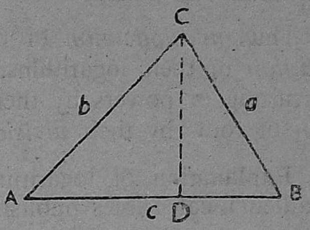
$$\tan A = \frac{a}{c} = \cot (90° - A)$$

$$\cot A = \frac{c}{a} = \tan (90° - A)$$

$$\sec A = \frac{b}{c} = \operatorname{cosec} (90° - A$$

$$\operatorname{cosec} A = \frac{b}{a} = \sec (90° - A$$

6. In any triangle, the sines of the angles are proportional to their opposite sides.



Let ABC be a triangle,

$$\frac{\sin A}{a}=\frac{\sin B}{b},\ =\frac{\sin B}{b},\ =\frac{\sin C}{c},\ \text{and}$$

$$\frac{\sin C}{c}=\frac{\sin A}{a},$$

$$\text{i.e., } \frac{\sin A}{a}=\frac{\sin B}{b}=\frac{\sin C}{c}.$$

Proof:—From the point C draw CD perpendicular to the opposite side AB, cutting the triangle into two right-angled triangles CDA and CDB.

In the triangle CDA, $\frac{CD}{CA}$, i.e., $\frac{CD}{b}=\sin A$.

Therefore, $CD=b \sin A$.

In the triangle CDB, $\frac{CD}{CB}$, i.e., $\frac{CD}{a}=\sin B$.

Therefore, $CD=a \sin B$.

Therefore, $b \sin A=a \sin B$, i.e., $\frac{\sin A}{a}=\frac{\sin B}{b}$.

In a similar manner, by drawing a perpendicular from A upon BC, it can be proved that $\frac{\sin B}{b}=\frac{\sin C}{c}$.

Hence, $\frac{\sin A}{a}=\frac{\sin B}{b}=\frac{\sin C}{c}$.

From the above, it will also be seen that,

$$\frac{\sin A}{\sin B}=\frac{a}{b},\ \frac{\sin B}{\sin C}=\frac{b}{c}\ \text{and}\ \frac{\sin C}{\sin A}=\frac{c}{a}.$$

7. In any triangle, the three sides and the three angles are called the **Elements** of the triangle.

When any three elements of a triangle are given, provided they be not the three angles, its other angles and sides can be calculated and the process of calculation is called the **Solution of the triangle**.

8. The solution of triangle is performed by the use of **Tables of Logarithms.**

9. Logarithms are a series of artificial numbers adopted in a certain way to a series of natural numbers to facilitate the process of numerical calculation.

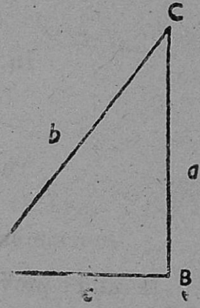
Thus *multiplication* of natural numbers can be performed by *addition* of their logarithms, *division* by their *subtraction, involution* or raising of powers by their *multiplication* and *evolution* or *extraction* of roots by their *division.*

Explanation of logarithms and their use will be found in the Mathematical Tables published by Chambers, Hutton and others.

10. Tables I and II and the sample solutions which follow explain the method of performing the solution of triangles.

11. In the solution of right-angled triangles, six cases present themselves, in each of which 3 elements, are given and it is required to find the other 3 elements.

1. *Given the hypotenuse and two angles.*
2. *Given the base and two angles.*
3. *Given the perpendicular and two angles.*
4. *Given the hypotenuse and perpendicular.*
5. *Given the hypotenuse and base.*
6. *Given the perpendicular and base.*



In the last three cases, the third element is the right angle itself.

12. The following table gives the formula generally used for the solution of the six cases mentioned above:—

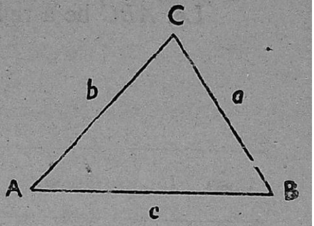
Let ABC be a right-angled triangle having the right-angle at B.

TABLE I.

Case.	Given.	Required.	Formula.
1	b, hypotenuse	c, base	$c = b \cos A$
	A, angle	a, perpendicular ..	$a = b \sin A$
	B ,, ...	C, 3rd angle ..	$C = 90° - A$
2	a, base	a, perpendicular ..	$a = c \tan A$
	A, angle	b, hypotenuse ..	$b = c \sec A$
	B ,, ...	C, 3rd angle ..	$C = 90° - A$
3	a. perpendicular ..	c, base	$c = a \cot A$
	A, angle	b, hypotenuse ..	$b = a \operatorname{cosec} A$
	B ,, ...	C, 3rd angle ..	$C = 90° - A$
4	b, hypotenuse ..	A, angle	$\sin A = \frac{a}{b}$
	a, perpendicular ..	C ,, ...	$C = 90° - A$
	B, angle	c, base	$c = \sqrt{(b+a)(b-a)}$
5	b, hypotenuse ..	A, Angle	$\sec A = \frac{b}{c}$
	c, base	C, ,, ...	$C = 90° - A$
	B, angle	a, perpendicular ..	$a = \sqrt{(b+c)(b-c)}$
6	a, perpendicular ..	A, angle	$\tan A = \frac{a}{c}$
	c, base	C ,, ...	$C = 90° - A$
	B, angle	b, hypotenuse ..	$b = c \sec A$

13. In the solution of oblique-angled (other than right-angled) triangles the following four cases present themselves, in each of which 3 elements are given and it is required to find the other 3 elements :—

1. *Given two angles and a side.*
2. *Given two sides and the angle opposite one of them.*
3. *Given two sides and the included angle.*
4. *Given the three sides.*



14. The following table gives the formula generally used for the solution of the four cases mentioned above :—

Let ABC be an oblique-angled triangle.

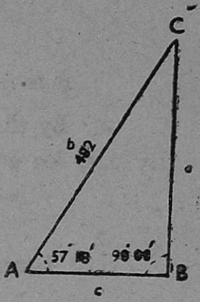
TABLE II.

Case.	Given.	Required.	Formula.
1	A, angle	C, 3rd angle ..	$c = 180° - (A + B)$
	B ,, ...	a, side	$a = b\dfrac{\sin A}{\sin B}$
	b, one side	c ,, ...	$c = \dfrac{\sin C}{\sin B}$
2	a, side	A, angle	$\sin A = \dfrac{a}{b}\sin B$
	b ,, ...	C ,, ...	$C = 180° - (A + B)$
	B, angle opposite to b	c, 3rd side	$c = b\dfrac{\sin C}{\sin B}$
3	c, side	C, angle	$\tan\dfrac{C - B}{2} = \dfrac{c - b}{c + b} \times \cot\dfrac{A}{2}$
	b ,, ...	B ,, ...	$\dfrac{C + B}{2} = \dfrac{180° - A}{2}$
	A, included angle ..	a, 3rd side ..	$C = \dfrac{C + B}{2} + \dfrac{C - B}{2}$
			$B = \dfrac{C + B}{2} - \dfrac{C - B}{2}$
			$a = b\dfrac{\sin A}{\sin B}$
4	a, side	A, angle	$\sin\dfrac{A}{2} = \sqrt{\dfrac{(s-b)(s-c)}{bc}}$
	b ,, ...	B ,, ...	$\cos\dfrac{B}{2} = \sqrt{\dfrac{s(s-b)}{ca}}$
	c ,, ...	C ,, ...	$\tan\dfrac{C}{2} = \sqrt{\dfrac{(s-a)(s-b)}{s(s-c)}}$

SOLUTION OF RIGHT-ANGLED TRIANGLES.

Solution No. 1.

Given the hypotenuse and two angles, to find the base, the perpendicular and the third angle. (*Table I, Case* 1).



Let ABC be a right-angled triangle having

the hypotenuse $b = 482$,

„ angle $A = 57° \ 18'$

„ „ $B = 90°$;

it is required to find c, a and C

By the formula, $c = b \cos A$.

By logs, $\log c = \log b + L \cos A - 10$

$= \log 482 + L \cos 57° \ 18' - 10$

$\log 482 = 2{\cdot}6830470$

$L \cos 57° \ 18' = 9{\cdot}7325870$

$12{\cdot}4156340$

10

$2{\cdot}4156340$

$\log 260{\cdot}39 = 2{\cdot}4156243$

$\log c = \log 260{\cdot}396$

$c =$ **260·396** or **260·4**

By the formula, $a = b \sin A$.

By logs, $\log a = \log b + L \sin A - 10$

$= \log 482 + L \sin 57° \ 18' - 10$

$\log 482 = 2{\cdot}6830470$

$L \sin 57° \ 18' = 9{\cdot}9250597$

$12{\cdot}6081067$

10

$2{\cdot}6081067$

$\log 405{\cdot}60 = 2{\cdot}6080979$

$\log a = \log 405{\cdot}608$

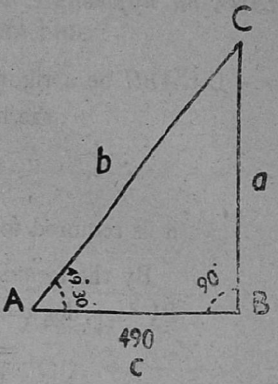
$a =$ **405·608** or 405·6

Angle $C = 90° - A$ or $90° - 57° \ 18' = 32° \ 42'$

42-29-20

Solution No. 2.

Given the base and the two angles, to find the perpendicular, the hypotenuse and the third angle. (Table I, Case 2).



Let ABC be a right angled triangle having

the base $c = 490$,

,, angle $A = 49^\circ\ 30'$,

,, ,, $B = 90^\circ$

it is required to find a, b and C.

By the formula, $a = c \tan A$.

By logs, $\log a = \log c + L \tan A - 10$.

$= \log 490 + L \tan 49^\circ\ 30' - 10$.

$\log 490 = 2{\cdot}6901961$

$L \tan 49^\circ\ 30' = 10{\cdot}0685011$

$12{\cdot}7586972$

10

$2{\cdot}7586972$

$\log 573{\cdot}71 = 2{\cdot}7586924$

$\log a = \log 573{\cdot}716$

$a = 573{\cdot}716$ or $573{\cdot}7$

By the formula, $b = c \sec A$.

By logs, $\log b = \log c + L \sec A - 10$

$= \log 490 + L \sec 49^\circ\ 30' - 10$

$\log 490 = 2{\cdot}6901961$

$L \sec 49^\circ\ 30' = 10{\cdot}1874556$

$12{\cdot}8776517$

10

$2{\cdot}8776517$

$\log 754{\cdot}48 = 2{\cdot}8776477$

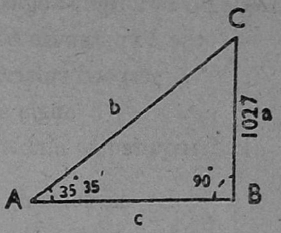
$\log b = \log 754{\cdot}487$

$b = 754{\cdot}487$ or $754{\cdot}5$

Angle $C = 90^\circ - A$ or $90^\circ - 49^\circ\ 30' = 40^\circ 30'$

Solution No. 3.

Given the perpendicular and two angles, to find the base, the hypotenuse and the third angle. (*Table I, Case* 3.)



Let ABC be a right-angled triangle having

the perpendicular $a = 1027$

,, angle $A = 35° \ 35'$,

,, ,, $B = 90°$;

it is required to find c, b and C.

By the formula, $c = a \cot A$.

By logs, $\log c = \log a + L \cot A - 10$

$= \log 1027 + L \cot 35° \ 35' - 10$

$\log 1027 = \ 3{\cdot}0115704$

$L \cot 35° \ 35' = 10{\cdot}1453966$

$13{\cdot}1569670$

10

$3{\cdot}1569670$

$\log 1435{\cdot}3 = 3{\cdot}1569427$

$\log c = \log 1435{\cdot}38$

$c =$ **1435·38** or **1435·4**.

By the formula, $b = a \operatorname{cosec} A$.

By logs, $\log b = \log a + L \operatorname{cosec} A - 10$

$= \log 1027 + L \operatorname{cosec} 35° \ 35' - 10$

$\log 1027 = \ 3{\cdot}0115704$

$L \operatorname{cosec} 35° \ 35' = 10{\cdot}2351618$

$13{\cdot}2467322$

10

$3{\cdot}2467322$

$\log 1764{\cdot}9 = 3{\cdot}2467201$

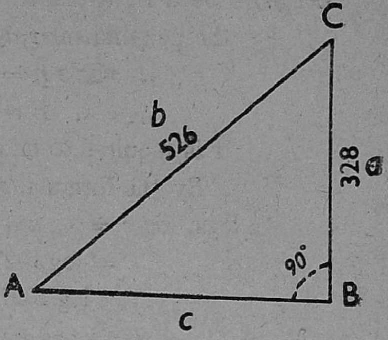
$\log b = 1764{\cdot}95$

$b =$ **1764·95** or 1764·9

Anglo $C = 90° - A$ or $90° - 35° \ 35' = 54° \ 25'$

Solution No. 4.

Given the hypotenuse, the perpendicular and the right angle, to find the other two angles and the base. (*Table I, Case* 4).



Let ABC **be a right-angled triangle having**

the hypotenuse $b = 526$,

,, perpendicular $a = 328$,

,, angle $B = 90°$;

It i required to find A, C and c.

By the formula, $\sin A = \frac{a}{b}$

By logs, $L \sin A - 10 = \log a - \log b$

$L \sin A = \log a - \log b + 10$

$= \log 328 - \log 526 + 10$

$\log 328 = 2{\cdot}5158738$

$\log 526 = 2{\cdot}7209857$

$\overline{1}{\cdot}7948881$

10

$9{\cdot}7948881$*

$L \sin 38° 34' = 9{\cdot}7947841$

$L \sin A = L \sin 38° 34' 39''{\cdot}39$

Angle A **= 38°34′39″·39** or **38°34′39″.**

* 9·7948881
9·7947841 $L \sin 38° 34'$
1040
60
1584)62400(39″·39
4752
14880
14256
6240
4752
14880
14256
6240

Angle $C = 90° - A$ or $90° - 38° 34'39'' = 51° 25'21''$.

By the formula, $c = \sqrt{(b + a)(b - a)}$

$= \sqrt{(526 + 328)(526 - 328)}$

$= \sqrt{854 \times 198}$

By logs, $\log c = \log \sqrt{854 \times 198}$

$= \frac{1}{2}(\log 854 + \log 198)$

$\log 854 = 2{\cdot}9314579$

$\log 198 = 2{\cdot}2966652$

$2)5{\cdot}2281231$

$2{\cdot}6140616$

$\log 411{\cdot}20 = 2{\cdot}6140531$

$\log c = \log 411{\cdot}208$

$C = 411.208$ or $411{\cdot}2$

Solution No. 5.

Given the hypotenuse, the base and the right angle, to find the other two angles and the perpendicular. (Table I, Case 5.)

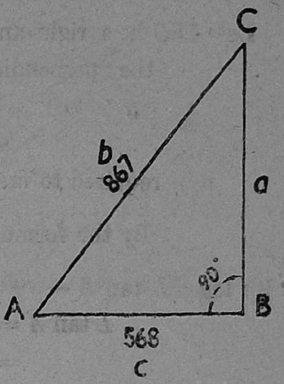
Let ABC be a right-angled triangle having

the hypotenuse $b = 867$,

„ base $c = 568$,

„ angle $B = 90^\circ$

it is required to find A, C and a.



By the formula, $\sec A = \frac{b}{c}$.

By logs, $L \sec A - 10 = \log b - \log c$

$L \sec A = \log b - \log c + 10$

$= \log 867 - \log 568 + 10$

$\log 867 = 2{\cdot}9380191$

$\log 568 = 2{\cdot}7543483$

$0{\cdot}1836708$

10

$10{\cdot}1836708^*$

$L \sec 49^\circ 04' = 10{\cdot}1836391$

$L \sec A = L \sec 49^\circ 04' 13''$

Angle $A = \mathbf{49^\circ 04' 13''}$.

* 10·1836708
10·1836391 L sec 49°04′

317
60
1457)19020(13″·0
1457

4450
4371

790

Angle $C = 90^\circ - A$ or $90^\circ - 49^\circ 04' 13'' = 40^\circ 55' 47''$.

By the formula, $a = \sqrt{(b+c)(b-c)}$

$= \sqrt{(867+568)(867-568)}$

$= \sqrt{1435 \times 299}$

By logs, $\log a = \log \sqrt{1435 \times 299}$

$= \frac{1}{2} (\log 1435 \times \log 299)$.

$\log 1435 = 3{\cdot}1568519$

$\log 299 = 2{\cdot}4756712$

$2\,)5{\cdot}6325231$

$2{\cdot}8162616$

$\log 655.03 = 2{\cdot}8162612$

$\log a = \log 655{\cdot}031$

$A = \mathbf{655{\cdot}031}$ or 655

Solution No. 6.

Given the perpendicular and the base, and the right angle, to find the other two angles and the hypotenuse. (*Table I, Case* 6).

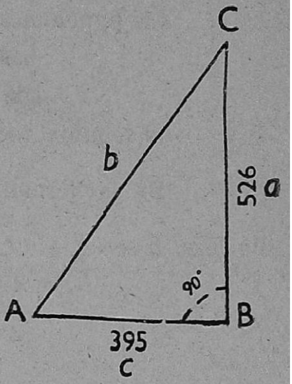
Let ABC be a right-angled triangle having

the perpendicular $a = 526$,

" base $c = 395$,

" angle $B = 90°$

it is required to find A, C and b.



By the formula, $\tan A = \frac{a}{c}$

By logs, $L \tan A - 10 = \log a - \log c$

$L \tan A = \log a - \log c + 10$

$= \log 526 - \log 395 + 10$

$\log 526 = 2{\cdot}7209857$

$\log 395 = 2{\cdot}5965971$

$0{\cdot}1243886$

10

$10{\cdot}1243886$*

$L \tan 53° 05' = 10{\cdot}1242004$

$L \tan A = L \tan 53° 05' 42''{\cdot}9$

Angle A = 53° 05′ 42″·9 or 53° 05′ 43″

Angle $C = 90° - A$ or $90° - 53° 05' 43'' = 36° 54' 17''$.

* 10·1243886
10·1242004 L tan 53°05′
1882
60
2631)112920(42″·9
10524
7680
5262
24180
23679
5010

By the formula, $b = c \sec A$

By logs, $\log b = \log c + L \sec A - 10$

$= \log 395 + L \sec 53° 05' 43'' - 10$

$\log 395 = 2{\cdot}5965971$

$L \sec 53° 05' 43'' = 10{\cdot}2214970$

$12{\cdot}8180941$†

10

$2{\cdot}8180941$

$\log 657{\cdot}8 = 2{\cdot}8180939$

$\log b = \log 657{\cdot}80$

b = 657 80 or 657·8

† Difference for 1 = 1682
1682
43
5046
6728
60)72326
1205·4 or 1205
10·2213765 L sec 53°05′
1205
10·2214970 L sec 53°05′43″

SOLUTION OF OBLIQUE-ANGLED TRIANGLES.

Solution No. 7.

Given two angles and a side, to find the third angle and the other two sides. (*Table II, Case* 1.)

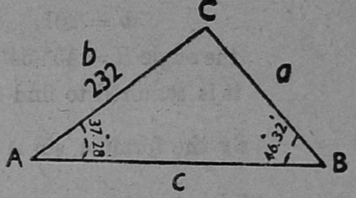
Let ABC be a triangle having

the angle $A = 37° 28'$,

,, $B = 46° 32'$,

the side $b = 232$;

it is required to find C, a and c



Angle $C = 180° - (A + B) = 180° - (37°28' + 46° 32')$ or $180° - 84° = 96°$

By the formula, $a = b \dfrac{\sin A}{\sin B}$

By logs, $\log a = \log b + (L \sin A - 10) - (L \sin B - 10)$

$= \log b + L \sin A - L \sin B$

$= \log 232 + L \sin 37° 28' - L \sin 46° 32'$

$\log 232 = 2{\cdot}3654880$

$L \sin 37° 28' = 9{\cdot}7841177$

$12{\cdot}1496057$

$L \sin 46° 32' = 9{\cdot}8608018$

$2{\cdot}2888039$

$\log 194{\cdot}44 = 2{\cdot}2887856$

$\log a = \log 194{\cdot}448$

$a =$ **194·448 or 194·4**

By the formula, $c = b \dfrac{\sin C}{\sin B}$.

By logs, $\log c = \log b + (L \sin C - 10) - (L \sin B - 10)$

$= \log b + L \sin C - L \sin B$

$= \log 232 + L \sin 96° - L \sin 46° 32'$

$\log 232 = 2{\cdot}3654880$

$L \sin 96° = 9{\cdot}9976143$

$12{\cdot}3631023$

$L \sin 46° 32' = 9{\cdot}8608018$

$2{\cdot}5023005$

$\log 317{\cdot}90 = 2{\cdot}5022905$

$\log c = \log 317{\cdot}907$

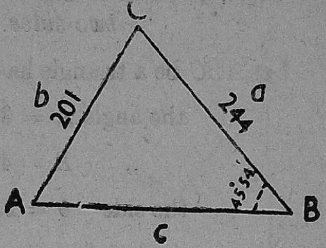
$c =$ **317·907 or 317·9.**

Rule.—As the given since is to the sign of the angle opposite to the given side so i the regulred side to the sign of the angle opposite to the required side.

Solution No. 8.

***Given** two sides and the angle opposite to one of them, to find the other two angles and the third side (Table II, Case. 2).*

Let ABC be a triangle having
the side $a = 244$,
,, $b = 201$,
the angle $B = 45° 54'$;
it is required to find A, C and c.



By the formula, $\sin A = \frac{a}{b} \sin B$.

By logs, $L \sin A - 10 = \log a - \log b + L \sin B - 10$

$$L \sin A = \log a - \log b + L \sin B$$
$$= \log 244 - \log 201 + L \sin 45° 54'$$
$$\log 244 = 2{\cdot}3873898$$
$$\log 201 = 2{\cdot}3031961$$
$$0{\cdot}0841937$$
$$L \sin 45° 54' = 9{\cdot}8562008$$
$$9{\cdot}9403945^{*}$$
$$L \sin 60° 39' = 9{\cdot}9403381$$
$$L \sin A = L \sin 60° 39' 47''{\cdot}66$$

Angle A = 60° 39′ 47″·66 or 60° 39′ 48″.

* 9·9403945
9·9403381 $L \sin 60° 39$
564
60
710) 33840 (47″·66
2840
5440
4970
4700
4260
4400
4260
1400

Angle $C = 180° - (A + B)$ or $180° - (60° 39' 48'' + 45° 54') = 73° 26' 12''$

By the formula, $c = b \frac{\sin C}{\sin B}$

By logs, $\log c = \log b + (L \sin C - 10) - (L \sin B - 10)$

$$= \log b + L \sin C - L \sin B$$
$$= \log 201 + L \sin 73° 26' 12'' - L \sin 45° 54'$$
$$\log 201 = 2{\cdot}3031961$$
$$L \sin 73° 26' 12'' = 9{\cdot}9815945^{\dagger}$$
$$12{\cdot}2847906$$
$$L \sin 45° 54' = 9{\cdot}8562008$$
$$2{\cdot}4285898$$
$$\log 268{\cdot}28 = 2{\cdot}4215883$$
$$\log c = \log 268{\cdot}281$$

c = 268·281 or 268·3.

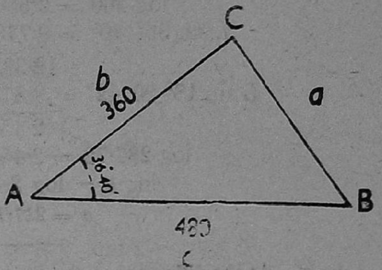
† Difference for 1′ = 375
375
12
60) 4500
75

9·9815870 $L \sin 73° 26'$
75
9·9815945 $L \sin 73° 26' 12''$

Rule.—As the sine of the given angle is to the given side opposite to the given angle, so is the sine of the required angle to the side opposite to the required angle.

Solution No. 9.

Given two sides and the included angle, to find the other two angles and the third side. (Table II, Case 3).



Let ABC be a triangle having

the side $c = 480$,

,, $b = 360$,

the angle $A = 36° \ 40'$;

it is required to find C, B and a.

$c - b = 120$; and $c + b = 840$

$$\frac{C+B}{2} = \frac{180° - A}{2} = \frac{180° - 36° \ 40'}{2} \text{ or } 71° \ 40'; \text{ and } \frac{A}{2} = \frac{36° \ 40'}{2} \text{ or } 18° \ 20'$$

By the formula, $\tan \frac{C-B}{2} = \frac{c-b}{c+b} \times \cot \frac{A}{2}$

By logs, $L \tan \frac{C-B}{2} - 10 = \log (c-b) - \log (c+b) + L \cot \frac{A}{2} - 10$

$$= \log 120 - \log 840 + L \cot 18° \ 20' - 10$$

$$L \tan \frac{C-B}{2} = \log 120 - \log 840 + L \cot 18° \ 20'$$

$\log 120 = 2{\cdot}0791812$
$\log 840 = 2{\cdot}9242793$
$\bar{1}{\cdot}1549019$
$L \cot 18° \ 20' = 10{\cdot}4796948$
$9{\cdot}6345967$*
$L \tan 23° \ 19' = 9{\cdot}6344903$

$$L \tan \frac{C-B}{2} = L \tan 23° \ 19' \ 18''{\cdot}37$$

```
*9·6345967
 9·6344903  L tan 23° 19
      1064
        60
3475) 63840 (18″·37
      3475
      29090
      27800
       12900
       10425
        24750
        24325
         4250
```

$$\frac{C-B}{2} = 23° \ 19' \ 18''{\cdot}37 \text{ or } 23° \ 19' \ 18''$$

$$C = \frac{C+B}{2} + \frac{C-B}{2} = 71° \ 40' + 23° \ 19' \ 18'' = 94° \ 59' \ 18''$$

$$B = \frac{C+B}{2} - \frac{C-B}{2} = 71° \ 40' - 23° \ 19' \ 18'' = 48° \ 20' \ 42''$$

By the formula, $a = b \dfrac{\sin A}{\sin B}$

By logs, $\log a = \log b + (L \sin A - 10) - (L \sin B - 10)$

$= \log b + L \sin A - L \sin B$

$= \log 360 + L \sin 36° 40' - L \sin 48° 20' 42''$

$$\begin{aligned} \log 360 &= 2{\cdot}5563025 \\ L \sin 36° \; 40' &= 9{\cdot}7760897 \\ &\overline{12{\cdot}3323922} \\ L \sin 48° \; 20' 42'' &= 9{\cdot}8734139\dagger \\ &\overline{2{\cdot}4589783} \\ \log 287{\cdot}72 &= 2{\cdot}4589701 \\ \log a &= \log 287{\cdot}725. \\ a &= 287{\cdot}725 \text{ or } 287{\cdot}7. \end{aligned}$$

† Diff. for 1′ = 1124

$$\begin{array}{r} 1124 \\ 42 \\ \hline 2248 \\ 4496 \\ \hline 60)\ 47208 \\ \hline 786{\cdot}8 \text{ or } 787 \end{array}$$

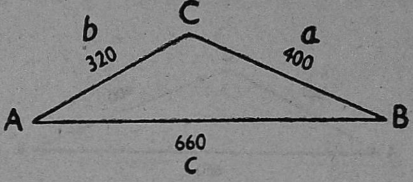
9·8733352 L sin 48° 20′
787
9·8734139 L sin 48° 20′ 42″

Rule.—As the difference of the two given sides is to their sum, so is the tangent of half the difference of the unknown angles to the cotangent of half the known angle; half the difference thus found added to half their sum gives the greater of the two angles and deducted, leaves the lesser. The third side is then found by Solution No. 7.

Solution No. 10.

Given the three sides to find the three angles. (*Table II*, *Case* 4.)

Let ABC be a triangle having the side $a = 400$, $b = 320$, and $c = 660$ it is required to find A, B and C.



s or $\dfrac{a+b+c}{2} = 690$, $s - a = 290$, $s - b = 370$, and $s - c = 30$.

By the formula, $\sin\dfrac{A}{2} = \sqrt{\dfrac{(s-b)(s-c)}{bc}},$

,, $\sin\dfrac{B}{2} = \sqrt{\dfrac{(s-c)(s-a)}{ca}},$

,, $\sin\dfrac{C}{2} = \sqrt{\dfrac{(s-a)(s-b)}{ab}},$

By logs, $L\sin A - 10 = \log\sqrt{\dfrac{(s-b)(s-c)}{bc}},$

$$L\sin\frac{A}{2} = \frac{1}{2}[(\log(s-b) + \log(s-c) - (\log b + \log c)] + 10$$

$$= \frac{1}{2}[(\log 370 + \log 30) - (\log 320 + \log 660)] + 10$$

$$\begin{array}{ll}
\log 370 = & 2{\cdot}5682017 \\
\log\ \ 30 = & 1{\cdot}4771213 \\
 & 4{\cdot}0453230 \quad . \ . \ . \ (1) \\
\log 320 = & 2{\cdot}5051500 \\
\log 660 = & 2{\cdot}8195439 \\
 & 5{\cdot}3246939 \quad . \ . \ . \ (2) \\
\tfrac{1}{2}[(1) - (2)] = 2) & \bar{2}{\cdot}7206291 \\
 & \bar{1}{\cdot}3603146 \\
 & 10 \\
 & 9{\cdot}3603146* \\
L\sin 13^\circ 15' = & 9{\cdot}3602154 \\
L\sin\dfrac{A}{2} = & L\sin 13^\circ 15'\ 11''.10
\end{array}$$

$$\begin{array}{l}
*\ 9{\cdot}3603146 \\
9{\cdot}3602154\ L\sin 13^\circ 15' \\
992 \\
60 \\
5361)\ 59520\ (11''{\cdot}10 \\
5361 \\
5910 \\
5361 \\
5490 \\
5361 \\
1290
\end{array}$$

$$\frac{A}{2} = 13^\circ 15'{\cdot}11''.10 \text{ or } 13^\circ 15' 11''$$

Angle A = 26° 30′ 22″

Similarly, B and C can be calculated with their respective formulæ.

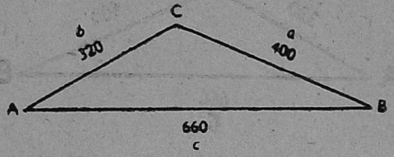
Rule.—From half the sum of the three sides, subtract separately each of the two sides containing the unknown angle. Multiply the two remainders together and divide the product of the two sides containing the unknown angle. The square root of the quotient is the cosine of half the unknown angle.

Solution No. 11.

In solution No. 10 to solve the triangle by using the second formula given in Table II, Case 4.

We have $a = 400$, $b = 320$, and $c = 660$;

and s or $\dfrac{a+b+c}{2} = 690$ $(s-a) = 290$, $(s-b) = 370$ and $(s-c) = 30$.



By the formula, $\cos\dfrac{A}{2} = \sqrt{\dfrac{s(s-a)}{bc}}$,

" $\cos\dfrac{B}{2} = \sqrt{\dfrac{s(s-b)}{ca}}$,

" $\cos\dfrac{C}{2} = \sqrt{\dfrac{s(s-c)}{ab}}$,

By logs, $L\cos\dfrac{B}{2} - 10 = \log\sqrt{\dfrac{(s\ -\ b)}{ca}}$,

$$L\cos\frac{B}{2} = \frac{1}{2}[(\log s + \log(s-b) - (\log c + \log a)] + 10.$$

$$= \frac{1}{2}[(\log 690 + \log 370) - (\log 660 + \log 400)] + 10.$$

$\log 690 = 2{\cdot}8388491$
$\log 370 = 2{\cdot}5682017$
$5{\cdot}4070508$ . . . (1)
$\log 660 = 2{\cdot}8195439$
$\log 400 = 2{\cdot}6020600$
$5{\cdot}4216039$ . . . (2)
$\frac{1}{2}[(1) - (2)] = 2)\ \bar{1}{\cdot}9854469$
$\bar{1}{\cdot}9927235$
10
$9{\cdot}9927235$
$L\cos 10^\circ 27' = 9{\cdot}9927362$*

$L\cos\dfrac{B}{2} = L\cos 10^\circ 27' 32''{\cdot}70$

$\dfrac{B}{2} = 10^\circ 27' 32''{\cdot}70$ or $10^\circ 27' 33''$

Angle $B = 20^\circ\ 55'\ 06''$.

* 9·9927362 $L\cos 10^\circ 27'$
9·9927235
127
60
233) 7620 (32″ 70
699
630
466
1640
1631
90

Similarly, A and C can be calculated with their respective formulae.

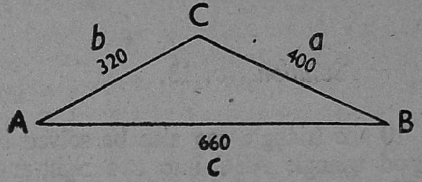
Rule.—Multiply half the sum of the three sides by the difference between the half sum and the side opposite to the unknown angle and divide the product by the product of the two sides containing the unknown angle. The square root of the quotient is the cosine of half the unknown angle .

Solution No. 12.

In Solution No. 10. to solve the triangle by using the third formula given in Table II, Case 4.

We have $a = 400$, $b = 320$, and $c = 660$;

and s or $\dfrac{a+b+c}{2} = 690$, $(s-a) = 290$, $(s-b) = 370$, and $(s-c) = 30$.



By the formula, $\tan\dfrac{A}{2} = \sqrt{\dfrac{(s-b),\ (s-c)}{s\ (s-a)}}$,

,, $\tan\dfrac{B}{2} = \sqrt{\dfrac{(s-c),\ (s-a)}{s\ (s-b)}}$,

,, $\tan\dfrac{C}{2} = \sqrt{\dfrac{(s-a),\ (s-b)}{s\ (s-c)}}$,

By logs, $L\tan\dfrac{C}{2} - 10 = \log\sqrt{\dfrac{(s-a),\ (s-b)}{s\ (s-c)}}$,

$$L\tan\frac{C}{2} = \frac{1}{2}\left\{[\log(s-a) + \log(s-b)] - [\log s + \log(s-c)]\right\} + 10$$

$$= \frac{1}{2}\left\{(\log 290 + \log 370) - (\log 690 + \log 30)\right\} + 10$$

log 290 = 2·4623980
log 370 = 2·5682017
5·0305997 . . . (1)
log 690 = 2·8388491
log 30 = 1·4771213
4·3159704 . . . (2)
$\frac{1}{2}$[(1) − (2)] = 2) 0·7146293
0·3573147
10
10·3573147*
L tan 66° 17′ = 10·3572227

$L\tan\dfrac{C}{2} = L\tan 66°\ 17'\ 16''\cdot08$

$\dfrac{C}{2} = 60°\ 17'\ 16''\cdot08$ or $66°17'16''$

* 10·3573147
19·3572227 L tan 66°17′
920
60
3431) 55200 (16″ ·08
3431
20890
20586
30400
27448
30400
27448
29520

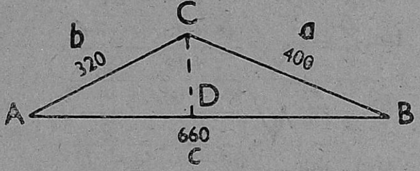
Angle $C = 132° 34' 32''$.

Similarly A and B can be calculated with their respective formulae.

Rule.—From half the sum of the three sides subtract separately each of the two sides containing the unknown angle; multiply the two remainders together and divide the product by the product of half the sum of the three sides and the difference between the half sum and the side opposite to the unknown angle. The square root of the quotient is the tangent of half the unknown angle.

Solution No. 13.

In solution No. 10 the triangle can also be solved by first dividing the oblique-angled triangle ABC into two right-angled triangles ADC and BDC by Theorem No. 14.



Having thus obtained the base and the perpendicular of each of the two right-angled triangles and their hypotenuse being already known, the other two angles of each triangle can be calculated by any of the solutions Nos. 4, 5 and 6.

SPHERICAL CO-ORDINATES.

In surveys undertaken for the measurement and preparation of maps for large areas, it is essential to fix certain Geographical points i.e., to ascertain their position in latitude and longitude with reference to an assumed first meridian or origin, for the construction of the skeletons for the maps.

The earth is spherical and hence the distances between any two points, their latitude and departure form the three sides of a right angled spherical triangle. When the latitude and longitude of the place of origin is available and the meridional and perpendicular distances from one origin to another fixed point is available, the latitude and longitude of the second place can be computed. This process is called the computation of spherical co-ordinates.

The computation is done in Survey Form No. 151 (old) and in the following manner. As the distance of 1 second of the meridional arc is 100 feet according to the table for convergency of meridions available in Rule 7 of Chapter IV, the meridional arc is obtained. Half of this approximate meridional Arc is to be added to the latitude of the origin, if the station lies to the north of the origin and is to be subtracted from the latitude of the origin, if the station lies to the south. The corresponding Logarithm (log) of the resultant figure is to be obtained from Table XXVI of the Auxiliary tables and this is subtracted from the log of the meridional co-ordinate. The anti log of the resultant log would give the true Meridional Arc in seconds.

TO FIND THE ARC VERSINE.

The perpendicular co-ordinate is converted into seconds by dividing it by 100 and the logarithm is found for this figure by using the Chambers Tables. Add or subtract the true meridional arc from the latitude of the origin according as the station is to its north or south of the origin. For the resultant figure, find the corresponding log in Table XXVI of the Auxiliary Tables. Subtract this from the first and multiply the resultant figure by 2. To this, add log for the latitude of the origin with reference to the table XXVIII of the Auxiliary Tables. The anti log of the resultant figure would give the Arc Versine in seconds.

TO FIND THE LATITUDE.

The Arc Versine is to be subtracted from the latitude of the origin and the meridional arc added to the remainder, if the station is north of the origin and subtracted if it is south of the origin. The resultant will be the latitude of the second station.

TO FIND THE LONGITUDE.

From the log of the perpendicular co-ordinate, subtract log in Table XXVII corresponding to the latitude found above. The anti log of the remainder will give the difference in longitude in seconds. This difference is to be added to the longitude of the origin, if the station is east of the origin and deducted if it is west of the origin. The resultant will be the longitude of the second station.

The working of spherical co-ordinates is rarely being done as the values of the several G.T stations and other Minor Trigonometrical stations are readily available in the Survey of India pamphlets.

COMPUTATION OF MAIN CIRCUITS.

The computation of Main circuits is taken up soon after the full set of records is received in the party office.

The records received are scrutinised preliminarily to list minor defects detailed in chapter IV and these defects are rectified before the computation is taken up.

The work is taken up by lines connecting one Great Trigonometrical station to another. The triangulation recorded are computed and the calculated angles and distances are entered in the traverse field book and traverse sketches.

The computation of the Azimuth observation is then taken up and is done in the following manner. The computation of Time by Sun's altitude in Survey Form No. 13 is taken up first, with reference to the observations recorded in the Survey Form No. 11. In this sheet, the longitude and latitude furnished are values and distances scaled off approximately for the approximate position of the point of observation from the graticules in the taluk map or other maps, the traverse plot of which has been done with sufficient accuracy. The other figures furnished are actual details.

The vertical angles entered in the record of observation should be entered in the Time sheet (Form No. 13) and the mean obtained by dividing the total by 4 (the total number of observations recorded). This will be the mean observed altitude. Similarly, the readings of the vertical level for the object and eye ends of the telescope entered in the record of observation should be copied in the form and totalled. The difference of the totals should be multiplied by the value of one division of the level for the instrument used, as recorded in page 1 of the record of observation. The mean of the level correction is found out by dividing the above product by 8 (the total number of observations recorded). The result should

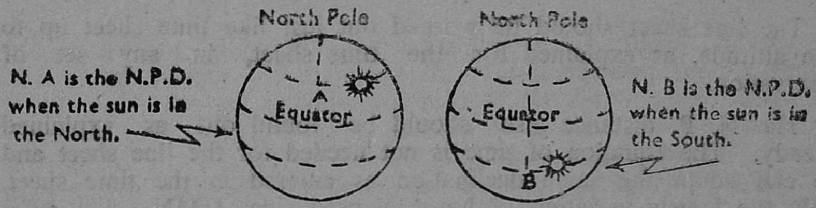
be added to the mean observed altitude of the total readings if the object endris greater than that of the eye end and substracted from it, if the total of the eye end is greater than that of the object end. This will give the correct mean of observed latitude.

The times of boservation recorded in the observation set are to be entered in the column provided and the mean of the total of these timings struck. This will be the *L.M.T.* of the observation and is entered under the column elements.

Now the longitude of the place of observation should be converted into hours by dividing the same by 15 (the sun takes one hour o pass the distance of 15 degrees) and the differences between this and the L.M.T, is the hours elapsed since Greenwich Mid-night

The declination of the sun is noted from the nautical almanac with the direction of the sun from the equator. The direction of the sun is determined as North or South, accordingly to the sign plus or minus entered in the nautical almanac.

The hourly variation should be calculated by dividing the difference of declination between the date of observation and its next date by 24 and hourly variation of the hours elapsed since Greenwich Mid-night also will be found out. The hourly variation will be added to or subtracted from, as the case may be, according as the declination of next date is more or less.



Similarly, the equation of time also is to be worked out but the direction of the sun is not necessary.

Now the declination will be added to 90 degrees or subtracted from 90° according as the direction of the sun is South or North respectively. Thus the N. P. distance is obtained.

The correct mean observed altitude already arrived at is entered at the next page. The correct mean observed altitude should be subtracted from 90°and the correction for refraction should be obtained for the resultant angle from table No. XXII in the Auxiliary table. This should be subtracted from the correct mean observed altitude.

According to the month of observation, the correction for the parallax corresponding to the mean observed altitude should be ascertained from Table XXI of the Auxiliary tables. The addition of the correction for parallax to the mean observed altitude and subtraction of the correction for refraction from the above total would give the true altitude.

The N. P., distance already obtained should be entered in the second page and should be added to the True altitude and latitude of the place of observation. Half the sum of the above total is reckoned and entered. With the help of the chambers tables, the logarithm of the angles indicated in the form would be obtained and entered. The tangent angle of half the sum of the above is to be ascertained and entered. The tangent angle obtained is to be multiplied by 2 and then divided by 15 to find the azimuthal time. This should be added to or subtracted from 12 according as the time of observation is afternoon or beforenoon respectively. From the resultant total, the equation of time is to be subtracted if the equation of time is minus or it is to be added if it is plus, as noted in the nautical almanac. This would give the Local mean time or Civil time of observation, calculated with reference to the Sun's altitude. The difference of the above with the Mean observed time indicates the time by which the watch is fast or slow.

THE PROCESS OF WORKING THE AZIMUTH BY SUN OF LINE SHEET.

The line sheet should be worked out just like time sheet up to true altitude, as explained for the time sheet, in any set of observation.

The N. P. distance also should be found out as explained already. The equation of time is not needed for the line sheet and we can adopt the same declination as entered in the time sheet. Only the hourly variation of hours elapsed since GMN. will differ with that in the time sheet as the L.M.T. of observation differs in each set of observation and the time has to be corrected, according as the watch is fast or slow as reckoned in the time sheet.

In the second page of the line sheet, the N.P. Distance will be added to the true altitude and latitude values and half the sum, found out as in the time sheet. Now the secant logs of half sum and N.P. Distance-half sum, sine logs of half sum-altitude and half sum-true altitude should be worked out and totalled. Half of the total gives the tangent angle. This should be multiplied by two and if the observation is taken in the erening the above angle is to be subtracted from 360 to obtain the sun's azimuth.

Now from the observation record, the mean of the angle between sun and referring object should be worked out and the difference between them also should be found out (i.e., sun minus referring object). The mean of these angles is called horizontal angle. This should be subtracted from the sun's azimuth. If the sun's azimuth is smaller than the horizontal angle, add 360 with sun's azimuth and subtract the horizontal angle. The result is the azimuth of the referring object (i.e.) bearing of the distance between the referring object and the station of observation.

The correction for convergency to be applied to the true bearings obtained by the computations of azimuth is worked out in the following manner.

The latitude and longitude entered in the azimuth observation sheets are those obtained by scaling off from the printed maps available. The latitude and longitude for the District origin and the Starting G.T. station are supplied by the Central Survey Office with reference to the values already worked out or the values available in the pamphlets supplied by the Survey of India. The perpendicular co-ordinate from the District origin to the starting G.T. station is to be noted in the statement in column 8 of the Form give in the specimen. This is required to work out the convergency correction to be supplies to the distances to the stations of observation, with reference to the table given in Rule 7 of Chapter IV of Survey Manual Volume 1.

The working of rectangular co-ordinates is then commenced This is the process of finding out the meridional and perpendicular co-ordinates of a place with reference to the latitude and longitude values. The working is done in S.F. No. 16, The latitudes and longitude of the station of origing and the commencing G.T. are adopted from the figure supplied by the Central Survey Office.

TO FIND THE PERPENDICULAR CO-ORDINATES.

The difference in the longitude of the station of origin and the G.T. station is reduced to seconds and the logarithm of this difference is entered with reference to the chamber's Tables. The logarithm of the latitude of the starting G.T. station obtained from Table XXVII of the Auxilary Tables (giving the linear value in feet for one second of arc and is logarithm measured along the meridian) is entered and both the logs are added. For this total log, the anti logarithm is found from the Chamber's Tables and this would give the perpendicular co-ordinate in feet. The measurements in feet are then converted into miles and entered in the appropriate column.

To the total of the logs found above, the constant log. 1804561 (which is the logarithm of the figure 100|66) is added and the antilog of this total would give the distance of the perpendicular co-ordinate in links.

TO FIND THE ARC VERSINE.

Twice the log of the difference in longitude noted above is then entered. To this the logarithm in table XXVIII of Auxiliary tables (containing the arc versines of spherical arcs of parallel one in length) corresponding to the latitude of the starting G.T. is added. The antilog for the total obtained would give the Arc Versine in seconds.

TO FIND THE MERIDIONAL CO-ORDINATE.

The arc versine is added to the latitude of the starting G. T. station and the difference between this and the latitude of the station of origin is obtained. The logarithm for this figure which is called the Meridional Arc, obtained from the Chamber's Tables is noted in the respective column.

From the latitude of origin half the meridion arc found above is deducted, if the starting G.T. Station lies south of the station of origin, or is added if the station lies to the North of Origin. To the resultant angle the corresponding log in table XXVI of the Auxiliary tables (containing the linear values in feet of 1 second of arc and it logarithm measured along the meridion) is obtained and entered. Both the logs are added and the antilog found for the total would give the meridional co-ordinate in feet which is also converted into miles. By the addition of the constant log. O. 1804561 to the total log obtained above and extraction of antilog for the resultant figure would give the meridional co-ordinate in links.

In the same manner, their retangular co-ordinates for the closing G. T. station with reference to the station of origin are worked out.

If the longitude of the station is greater than the station of origin, the station is said to be East of the origin and if it is smaller it will be to the west of the station of origin.

If the latitude of the station is greater than the station of origin, the station is said to be North and if it is smaller, the distance will be given as south.

The computation of the main circuit rough traverse is now taken up.

The main circuit angles and distances are entered from the traverse field books. The reduced bearings after application of correction for convergency to the true bearings are also entered with reference to the Azimuth computations. The angles between the two azimuth stations are added and to this the bearing of the first line is added. The resultant total when divided by 180 should agree to the reduced bearing at the second azimuth line within the allowable difference as the proof for the correctness of angular work. Similarly, the angles between the succeeding azimuth stations will be proved and adopted for the traverse. Then small corrections are applied and the bearings then worked out for the stations in between the azimuth stations. The long chain measurements are adopted for the traverse. After this the fair traverse sheets are prepared in Form No. 15.

The rectangular co-ordinates already worked out for the starting G.T. stations are entered first in columns Nos. 14 and 15 and this will be the basis for working the meridian and perpendicular distances from the station of origin for the succeeding stations.

The angles, bearings and distances are copied into the Fair traverse sheet from the rough traverse sheet and the meridian and the perpendicular distances for each line are worked out with the help, of Boileau's traverse tables. The co-ordinates are then added up.
of Boileau's traverse tables. The co-ordinates are then added up.
and closing G.T. stations are then added. The Northings and Southings, the Eastings and Westings should balance each other within the allowance of 1 per 1000, as a proof of the accuracy of the distance work. The minor corrections for the differences in the sets of co-ordinates are applied in longer distances duly taking into account the adjacent village and khandam circuits. The meridian and perpendicular distances of each station from the origin are then worked out.

COMPUTATION OF HYPOTENUSE.

The Hypotenuse is computed for the G.T. and Revenue Survey co-ordinates. The difference of latitude and Longitude co-ordinates of the G.T. survey is entered in the respective columns. The logarithm of the perpendicular distances is to be deducted from the logarithm of the Meridional distance. Add 10 in the character and find the Tan for the resultant logarithm.

For this angle, the secant value is obtained from the Chamber's Tables. To this is added the logarithm of the perpendicular distance. The character is reduced by 10 and anti log is obtained for the resultant log. This will give the hypotenuse in feet. This will be converted into miles. The constant log 0.1804561 is added to the total log and the anti log obtained for this figure will give , the hypotenuse distance in links.

Similarly the hypotenuse is computed with reference to Revenue Co-ordinates.

The hypotenuse is entered in the abstract of the fair traverse sheet and the difference of error is calculated per mile.

TRAVERSE PLOTTING.

A traverse is the course taken, in proceeding from one point on the earth's surface to another by a circuitous route, along lines of various length and situated in different directions. If a traverse is made from any point as Station 1 to any other point as station 9, the traverse 1, 2, 3, 4, 5, 6, 7, 8, 9 is termed as unclosed traverse but if the traverse is continued by some other route, say 9, 10, 11, 12, 13, 14, 15, 16, 17, back to station 1 to the starting point, thus forming a complete irregular polygon, it becomes a closed traverse.

In revenue surveys such a closed traverse is termed a circuit e.g. main circuits and village circuits, are formed and these again are split up into sub-circuits called khandam circuits. Minor circuits are formed when certain survey fields do not admit of chain traingulation such as large village sites, betal gardens, etc.

The horizontal angles formed by the successive lines are observed by the theodolite or circumferenter and the distances between successive stations are also measured and these are recorded. These traverses could be plotted with reference to the horizontal angles observed and the distances measured in the following manner. Select a convenient point on the paper to represent the first station on the ground, taking care to see that the other stations of the circuit may fall within the paper, and draw a line from this point in the approximate, direction of the next point and measure on it a length equal to the length measured in the field, according to the scale. This gives the second station. Place the protractor with its mid point, coinciding with the point making the second station and with half of the base of the protractor touching the first line, mark the angle subtended by the first and second lines as observed and recorded. Connect this point with the second station, draw a line with the scale and measure on it, a length equal to the measurement of the second line. according to the scale. This will give the 3rd station, here and at every succeeding station up to the last, the same process is to be repeated. Having arrived at the last station, join it with the first. Measure the distance and angle of the line so drawn and if they agree with those entered in the field book, the circuit has been correctly plotted; if not, the error must be located and corrected.

BEARING PLOTTING.

Meridians are north and south lines, which are supposed to pass through every station of a survey, running parallel to each other. In reality they are not parallel but converge towards the pole of earth but so insensible as to be unworthy of notice. Hence all traverses are made on the supposition that the surface of the earth is a plane. The angles which the successive lines of a traverse form with the meridian are called bearings and the line themselves, distances. The bearings of all the lines are directly observed in surveys done by the Prismatic Compass, while for surveys done by the theodolite or circumferenter, the bearings of the starting lines are obtained by calculation of Azimuth observation to the sun. The bearings of the succeeding stations are reduced as follows. To the bearing of the line proceeding that of the bearings sought add the inward angle formed by these two lines, and the same increased or diminished by 180° according as it may be less than or in excess of 180° will be the bearing of the next line. If the sum be 540° or more deduct, 360° from it, to get at the bearing. Having thus deduced the bearings of all lines the plotting is done in the following manner.

Just as in the case of angular plotting select a convenient point on the paper to represent the first station on ground so that the other stations of the circuit may fall within the paper. Then draw a line through this point pointing to the top of the paper and parallel to its edge, to represent the north and south line. From this, mark off by means of a protractor, the bearing of the first line through the point so marked and the first assumed point, draw a line and measure on it, a length equal to the length measured in the field, according to scale. This gives the second station. Through this, draw a line parallel to the north and south line at the first station, and lay off the bearing of the second line and afterwards, mark its distance, as before. This gives the 3rd station, here and at every succeeding station up to the last, the process is to be repeated. Having arrived at the last station, join it with the first. Measure the distance and the bearing of the line so drawn, and if they agree with the distance and the bearing of the line as recorded, the circuit can be taken to have been correctly plotted. If not, the error must be located and corrected. It will generally be found to have occured through not drawing the north and south lines at the various stations accurately parallel to each other, unless some error has been made either in plotting some of the angles with the protractor or in laying out the distances.

Plotting by Co-ordinates.

Although traverse circuits may be plotted with the protractor either with the observed angles and distances or with the bearings and distance they can be protracted by the method of rectangular co-ordinates, by which all risk of cumulative error in laying down incorrect

bearings and distances is obviated. The magnetic or true north line is drawn through the starting point and an east and west line at right angles there to through the same point. The calculation of the latitudes and departures are effected with the aid of Traverse Tables. The algebrial sum of the several sets of resolved distance should in any closed traverse, be equal to zero and this affords a verification of the whole before plotting it and enables it be plotted correctly without alterations. The calculation and plotting by the method of co-ordinates, otherwise called the Gale's Traverse System; is described below.

Bearing, distance, Latitude and departure.

As already observed, the angles which the successive lines of a traverse form with the meridian are called bearings. The lines are called distances. The quantity which one end of the line is due north or south by the other end is called the difference of latitude of the two ends of the line or its northing or southing and the quantity which one end of the line is due east or west of the other is called the departure or its easting or westing.

Rectangular Co-ordinates.

They are the latitudes and departures of the stations reckoned from the first station of a traverse called the station of origin. A Traverse plotted in the ordinary way by the protractor of successive bearings and distances is subject to much cumulative error and hence the method of the co-ordinates, known as Gale's system, where each station is laid of from a common meridian independently of the proceeding station, is resorted to for accuracy in plotting.

Cardinal Direction.—The deduced bearings of all the various lines of a traverse are found out and entered with reference to the bearing of the starting line. The magnitude of the deduced bearing gives at once the cardinal direction of the line. If the bearing be between 0° and 90 ° (i.e.) between the north and east the line must lie in (N.E quadrant. If between 90° and 180°, i.e., between south and east in the south-east quadrant and if between 180° and 270° i.e. between the south and west in the (S.W.) quadrant; and if between 270 ° and 360,° i.e., between north and west, i.e., in the (N.W.) quadrant. Thus the line A.B. whose bearing is 281°40' is in the (N.W.) quadrant.

Reduced bearings.—Since the logarithm tables only extend between 0° and 90° of arc, equivalents to all those bearings which are over 90° must be obtained. Those equivalents are termed reduced bearings and are what are used in the traverse computation to take out the

difference of latitudes and departures corresponding to each line. To obtain, therefore, the reduced bearings or angles formed with the meridian either for north or south proceed thus:—

When the bearing (observed or deduced) is between

O° and 90° N.E. no reduction is necessary

90° and 180° S.E. subtract it from 180°

180° and 270° S.W. subtract it from 180°

270° and 360° N.W. subtract it from 360°

Calculation of Latitudes and Departures.—The latitudes and departures of each station from the proceeding station are obtained either by the Traverse tables or by Logarithms with reference to the reduced bearings.

Latitude = Distance × Cos. Bearing (reduced)

Departure = Distance × Sin Bearing (reduced)

These computations are entered in the Traverse computation sheet in Survey Form No. 15.

Calculation of Co-ordinates.

The co-ordinate values of the other station of a circuit with reference to the station of origin the latitudes and departures of a station from the previous station being known can be found being always calculated to the east or west of the meridian passing through the station of origin or to the north or south of the perpendiculars, passing through the station of the origin by summing up the successive latitudes and departures up to each point, which may be comprised in the following Rule :—

When the distances run north of the first station add them one to another, until they change to south, then deduct them one by one, until the southing exceeds the northing, then deduct the latter from the former changing the denominations to the south ; all distances then going south are added, and those going north deducted and so on until the original starting point is arrived at. Likewise, in the distances of the perpendicular when the distances run East of the meridian of the first station, add them one by one until they change to the west, deduct them until westing exceeds the easting then deduct the latter from the former changing the denomination to the west. All distances then going west are added ; and those going east deducted and so on till the original starting point is arrived at.

Condition of a traverse.—When the traverse makes a complete circuit (i.e.), returns to the starting point, the following three conditions must be fulfilled:—

1. The sum of all the inward angles, must be equal to twice as many right angles as the figures has sides minus four right angles.

2. The sum of the northings or distances travelled north must be equal to the sum of the southings, or distances travelled south.

3. The sum of the eastings, or distances travelled east, must be equal to the sum of the westings, or distance travelled west.

Angular and Linear Corrections.

In practice, it will be found that the conditions mentioned above are not absolutely true, owing to unavoidable errors of observation or measurement in the field. The sum of the inward angles may be found to be excess or deficit by a few minutes of the required number of degrees, and the latitudes and departurers may not agree within several links, the limit of error allowed being one in 1,000 links. Hence it becomes necessary to apportion these errors. The total error, when known serves all practical purposes to apply a minute here and there against the larger angles with the sign + for — prefixed, as the case may require ; so also with the latitudes and departures apply a link here and there against the longest lines, with the sign + or — prefixed, as the case may be in the respective columns of northings, southings, eastings or westings. Strictly, the error should be apportioned to each of the distances by the following proportion:—"As the sum of all the distances is to the whole error, so is the distance to its correction."

Traverse Plotting.

To plot the traverse from the computation form, pick up a convenient point A on the paper, as the origin of the survey ; through A, draw a line N.S. to represent its meridian and another line W.E., perpendicular to the former. Now in a corner of the paper lay down the scales on which the plot is to be drawn. Then to plot station B, take from the computation form, its latitude and lay it off by means of a pair of compasses on the given scale, along the meridian line A. Again take from the computation sheet its departure and lay this off along the perpendicular line. Through the points laid and off, draw parallel lines to the perpendicular and meridian respectively, and lay this off along the perpendicular line. Through the points laid verify the distance. This should correspond with the measurement taken on ground similarly plot the other stations, each one with reference to the station of origin, according to the distance worked out in the computation sheet.

Map Projection.

A map is a representation of the surface of the earth or of any part of it, drawn on paper on which all the distances in so far as the deference of the surface, surface permits, bear the same proportion to one another as those in nature do. To construct a map of a district or country consists in making on paper a figure similar to the district or contour and representing making the prominent objects on its surface. A plan cannot be drawn until measurements of the area have been made on ground.

It is essential to fix certain geographical points for the construction of the skeletons of large map i.e., to ascertain their position in latitude and longitude with reference to an assumed first meridian:—

The earth being considered spherical turns round once in 24 hours on an imaginary axes passing through its Centre ; the extremities of this axis are its ploes, one being called the north pole and the other, the south poles. The territorial sphere is assumed to be out by a certain number of planes perpendicular to the rotary axis, the sections obviously being parallel to each other. That passing through the centre of the sphere (great circle) is called the equator or equinoctial line while all the other (small circles) are styled the parallels of latitude or simply parallels.

When a point is assumed on the terrestrial globe, the cutting plane may be supposed to pass through it and the axis of rotation, the section (a great circle) will be the meridian of the point, being perpendicular to the equator and the parallels and passing through the North and South Poles.

The latitude and longitude of a place may be defined in the following manner. The meridian to a given place being drawn in the way described above. The section there of intercepted between the equator and the given point is called the latitude which will be north or south, according as the meridional section, which is its measure, extends towards the North or South Pole.

The longitude is reckoned upon the equator commencing from any point arbitrarily assumed as the origin and continued till its intersection with the meridian of the given place. In the maps prepared in England and India, the meeting of the equator with the meridian of the Greenwich observatory is taken as the origin of the longitudinal arc which is measured both ways, viz.. the east and west of that meridian. The latitudes of places which lie in the northern hemisphere will be called north latitudes while those that lie in the southern hemisphere are called south latitudes. Places situated east of the prime meridian passing through the Greenwich observatory will have east longitudes and those situated west will have west longitudes All places situated upon the same meridians will have the same

longitude, while all those situated upon the same parallel have the same latitude. As the parallels of latitudes become smaller, as they approach the poles the arcs of those parallels intercepted between the same two time meridians will also be smaller, as we proceed from the equator to the pole, though in fact they consist of the same number of degrees. Hence a degree of longitude must be smaller towards the poles than at the equator and must become gradually smaller and smaller, till we arrive at the poles where it will vanish and become nothing. While the equator and parallels are circles, the meridians are eclipses, equal and similar to one another, whose degrees vary in length in the different altitudes.

Projection is the method by which terrestrial meridians and parallels are represented on paper. Any definite system of drawing the meridians and parallels is a map projection.

A graticule is a net work of lines drawn on paper to represent meridians (Longitudes) and parallel (Latitudes) of the earth. The graticules should be drawn on every small scale map which, as a rule, should be bounded by longitudes and latitudes. The object of the graticule is to identify positions and to enable new points to be plotted.

A memorandum of instructions for describing the graticules of maps comprising small portions of the globe have been drawn up for use in the Surveyor General's Office. The lengths in circles upto three places of decimal, of the sides and diagonals of differnt measures of latitude and longitude on various scales of different Auxiliary Tables of the Survey of India. These Tables also give the linear values in feet of one second of arc measured along, the meridians and along parallels of latitude whereby the computation of spherical and rectangular co-ordinates is facilitated. These tables are at present referred to for the projection of graticules for Taluk and District Maps. These tables duly revised with metric measures will have to be referred to, while plotting maps on the metric scales.

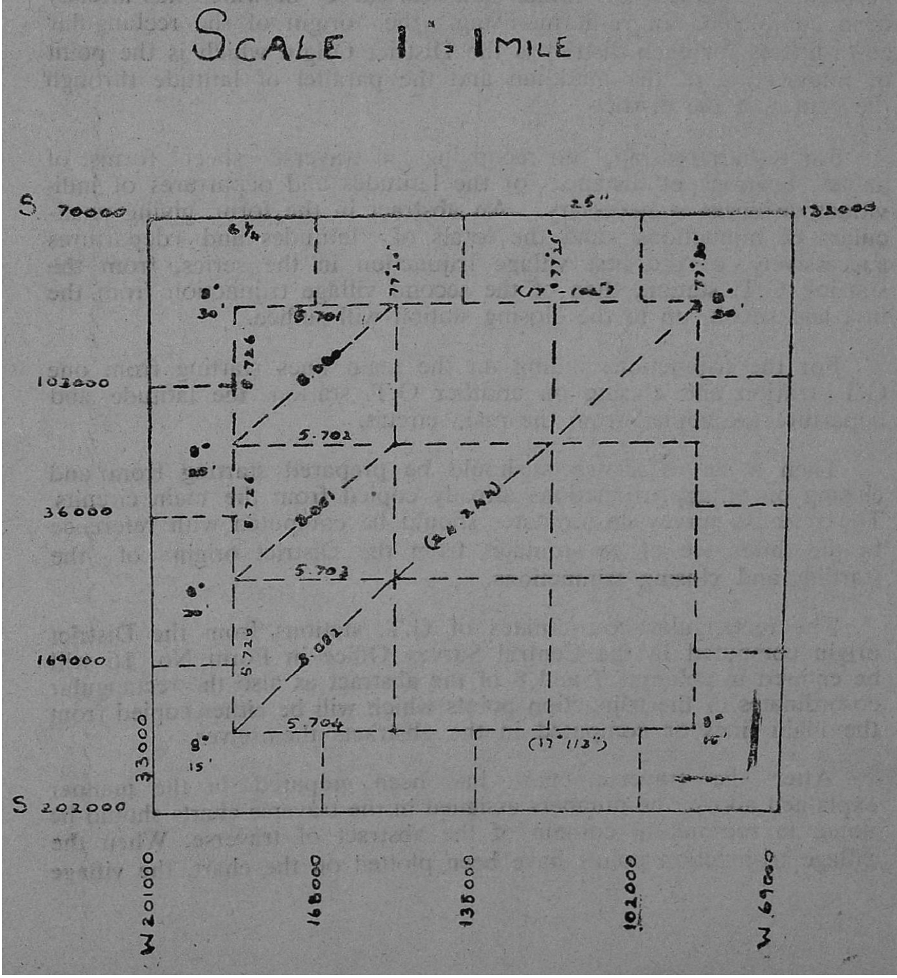
Preparation of Projection Sheets for the Taluk Maps.

The outer boundary of the Taluk is traced from the Atlas and the latitudes and longitudes within which the Taluk is situated is determined.

The rectangular co-ordinates of the four corners of the 15 minutes squares pertaining to the taluk should be computed with reference to the District origin. From the rectangular co-ordinates worked out, the total length of meridian and perpendicular required for plotting the taluk map is known. The number of sheets required is then determined according to the scale of the map.

An outer square larger in size than the area required for plotting the taluk is drawn on paper to allow sufficient margin for the heading, side names, reference and border lines to be inserted in the Taluk map. The size of the outer square is determined with reference to the space occupied by each individual map. Having determined the dimensions of the outer square the base line is plotted on the scale of the Taluk Map. The 3rd and 4th points i.e., the points in the northern side of the sheet are plotted with reference to the North-South measurements determined as above and calculated diagonal measurements. The points of intersection of the 15 minutes squares are then plotted from the outer square line, duly taking into account the excess taken to allow of the margin and the rectangular co-ordinates computed with reference to the district origin.

(*Vide* specimen diagram shown below.)



The lengths of the sides and diagonals of the 15 minutes squares are obtained from the Auxiliary Tables and the squares plotted already are checked with reference to these. The 15 minutes squares are then split up into 5 minutes squares by trisecting each line already plotted and joining the points so laid.

The meridian and perpendicular with reference to the district origin for all the G.T. stations will be worked out, if not already done and the stations plotted in the projection sheet. The village tri-junction points will also be plotted with reference to the re-harmonised traverse chart.

To prepare the projection sheets, the traverses should be re-harmonised in tracts, the initial cadastral survey of which has already been completed. In re-harmonising, the origin of the rectangular co-ordinates for each district is the District Origin which is the point of intersection of the meridian and the parallel of latitude through the centre of the district.

For re-harmonising, no recopying in traverse sheet forms, of angles, bearings or distances or the latitudes and departures of individual distances is necessary. An abstract in the form, giving particulars of bijunctions and the totals of latitudes and departures successively, of the first village trijunction in the series, from the starting G.T. station, then of the second village trijunction from the first and so on, up to the closing station will suffice.

For the trijunctions falling on the main lines starting from one G.T. station and closing on another G.T. station, the latitude and departure are copied from the main circuit.

Then a set of abstracts should be prepared starting from and closing on village trijunctions already copied from the main circuits. The revenue survey co-ordinates should be computed with reference to the difference of co-ordinates from the District origin of the starting and closing trijunctions.

The rectangular co-ordinates of G.T. stations from the District origin computed in the Central Survey Office in Form No. 16 will be entered in columns 7 and 8 of the abstract as also the rectangular co-ordinates of the trijunction points which will be either copied from the main lines or computed in the abstracts themselves.

After the traverse chart had been prepared in the manner explained above, the numbers assigned in the traverse charts should be noted in red ink in column of the abstract of traverse. When the village tri-junction points have been plotted on the chart, the village

boundaries pantagraphed to the scale (one inch = 1 mile, 1 m.m. : 5,000 m.m.) from the village map should be traced thereon.

The projected points and the graticule lines should be inked in pale blue. The apex of a small triangle with its vertex north will denote a G.T. station and the apex of a small triangle with its vertex south, a Madras trigonometrical station. Village trijunctions will be denoted by the centre of a small circle.

Projection sheets for the district touring maps are plotted according to the rectangular co-ordinates of the corners of 30 minutes squares, the rectangular co-ordinates of G.T. station and the Taluk trijunctions with reference to the District origin. Village trijunctions at the rate of one for every 50 square miles 100 sq. kilo metres, are also to be plotted in the projection sheets.

APPENDIX XII.

A. APPOINTMENT AND TRAINING OF UPPER SUBORDINATES.

Appointment to the category of Inspector of Survey and Land Records and Head Surveyors will be made by the Joint Director of Survey and Land Records in accordance with the special rules for the Tamil Nadu Survey and Land Records Subordinate Service.

The persons appointed by direct recruitment shall satisfactorily undergo training according to the syllabus appended below, and pass the prescribed departmental examinations to become eligible for permanent absorption.

A direct recruit probationer will have to execute the following agreement before he joins the post.

AGREEMENT.

1. KNOW all men by these presents that I, son of Thiru residing at am bound unto His Excellency the Governor of Tamil Nadu in the sum of paid to me during the period of training to be paid to the said Governor of Tamil Nadu or to his certain attorney, successors or assigns for which payment I bind myself, my heirs, executors, administrators and legal representatives, firmly by these presents. Sealed with my seal dated

2. WHEREAS the above bounden has entered the Tamil Nadu Survey and Land Records Department as a candidate for training in Survey at the expense of Government in view to being employed as an upper subordinate in field in the said department, and whereas in consideration of such training the above bounden has agreed to enter into a bond in the above mentioned sum of Rs. with such condition as is hereunder written.

3. NOW the condition of the above written bond is such that the bond shall be void, if the above bounden shall go through the full course of training prescribed by the Joint Director of Survey and Land Records and shall on completion of such training serve in the said department for a period of three years and shall during such course of training and the said period of three years abide by all the departmental rules and regulations and during such course of training abstain from engaging in any

other avocation and shall not leave the training in the middle of the course once for all or resign from Government service within a period of three years after training and if he so leaves or resigns within a period of three years send to the Joint Director of Survey and Land Records through the appropriate channel or direct to the Joint Director of Survey and Land Records complete information regarding his residence, appointments, if any, held salary and all or any other particulars required by the Joint Director of Survey and Land Records or if he is prevented by ill health, certified by a competent medical authority to the satisfaction of the Joint Director of Survey and Land Records from going through such full course of training and the said period of three years service thereafter or if during the trial period of first two months it appears to the Joint Director of Survey and Land Records that he is not likely to prove an efficient surveyor and he is in consequence required to leave the training class, provided the rejection was not due to moral delinquency. Otherwise the bond shall remain in full force.

4. Signed, sealed, and delivered by the above named in the presence of

5. I further agree to abide by the conditions laid down in G.O. No. 1908, Public (General-C), dated 7th September 1946.

Witness:

1.

2.

Signature.

BEFORE ME.

The course is as follows:—

B. SYLLABUS FOR THE TRAINING OF PROBATIONARY UPPER SUBORDINATES.

First Part.

1. Preliminary instructions in the use of the chain and cross staff, demarcation, field survey 1 m.m. : 2,000 m.m. and 1 m.m. : 5,000 m.m. area computation and preparation of simple and diagonal scales.

This instruction should be given by an Inspector of Survey and Land Records or Section Officer.

2. For the first fortnight the probationer will go out to field with a competent surveyor, and during the second fortnight when he will be working independently, the range deputy surveyor must assist him. Thereafter he must work without assistance. After two months he should realise the outturn of a Field Surveyor and this course will be extended, if necessary, until he is able to do so.

N.B.—On completion of this course, the Assistant / Deputy Director of Survey and Land Records should submit a report on the probationer's progress showing the outturn realised.

3. *Two weeks.*—Accompanying the Inspector of Survey and Land Records or section officer during inspection and preparing reports for the work inspected.

4. *Two months.*—Holding charge of a deputy surveyor's range. This period is to be extended unless the Inspector of Survey and Land Records or section officer is satisfied that the probationer is thoroughtly conversant with all the duties of a Range Deputy Surveyor, he has learnt to control his surveyors and to keep work progressing smoothly. It must be impressed on the probationer that it is the busintss of Range Deputy Surveyor (and of those of higher rank) to make the conditions of work easy for his surveyors, to help them to get coolies, accommodation, etc.

N.B.—On completion of this course the Assistant / Deputy Director of Survey andLand Records should submit a report on the probationer's progress.

5. *Two months.*—Instruction in the use of the theodolite including the temporary and permanent adjustments, traverse computation, azimuth observation and computation, subtense bar work, traverse plotting and protractor plotting. Plotting of fields in the 1 m.m. : 5,000 m.m. map and the use of the computing scale. The computation and subsequent processes should be taught in the unit office.

6. *Two weeks.*—' A ' work independently.

7. *Two months.*—Original as a ' B ' Surveyor. The period will be extended if necessary until the probationer is able to do the outturn expected from a ' B ' Surveyor. He must take at least four azimuths, work them out and connect one G.T.S.

Total time required under ordinary circumstance is 11½ months or 12 months with transfers.

The Deputy|Assistant Director of Survey and Land Records should submit a confidential report on completion of the training specified above giving his opinion with full reasons as to whether the probationer is likely to make a useful upper subordinate.

Second Part.

1. Traverse computation and harmonizing of a village and its Khandam, area not less than 8 square kilo metres. Three months in Central Survey Office.

Computation of rectangular co-ordinates.

Harmonizing a main circuit of about 260 square kilometres with reference to a district origin. Working out values for trijunctions and preparation of a traverse chart for a ¼ degree sheet. Six months.

(i) Field Sub-section charge.	(4 Months).
(ii) Training in Maintenance work with a Head Surveyor.	(1 Month).
With Inspector of Survey and Land Records and Deputy|Assistant Director of Survey and Land Records.	(1 Month).

At the end of this period, Deputy|Assistant Director of Survey and Land Records concerned should report how the probationer has done in comparison with other more experienced sub-section officer.

SYLLABUS FOR THE TRAINING OF COMPUTOR-DRAFTSMEN IN THE SURVEY AND LAND RECORDS DEPARTMENT.

1. Explanation of chains in use and construction of Scales, Simple and Diagonal.	One week.
2. Plotting of fields with sub-divisions on scale 1 m.m. : 2,000 m.m., 1 m.m. : 1,000 m.m., 1 m.m. : 5,000 m.m. Inking and figuring the same and counting areas of the fields and sub-divisions and also computing areas with computing Scale—Adjustment of areas.	Three weeks.
3. (*a*) Side comparison of fields and comparing original and duplicate F.M. Books, testing of plotting. (*b*) Calculating distance with reference to chain and Offsets.	One week.
4. Plotting of fields in village maps, protractor plotting.	Two weeks.

5. (*a*) Inking the maps for reproduction to scale and reduction to smaller scales. (*b*) Inserting topographical details, typing and printing names.	Two weeks.
6. Examination of traverse field books, 'B' sketches repetition of angles and vice versa and instructions on traverse survey and use of logarithmic tables—Traverse computation, and plotting—Solution of Triangles—Computation of Azimuth—Harmonisation of Main Circuits.	Three weeks.
	Total—12 weeks.

B.P. Rout No. 268 dated 16-1-1952.

SYLLABUS FOR TRAINING PROBATIONERS AS FIELD SURVEYORS.

Period: 2 Months.

1st week—
1st Day.

Morning :—Chain Survey and Land Records Manual, Part I, Chapter IV, Paras 1 to 5 and exercises 1 to 3.

Evening :—Arithmetic. Chapter I and 15 exercises

2nd Day :—Morning—Measurement of uneven ground, Chapter IV, paras 6 to 9.

Evening:—Definitions and Simple Geometry. Chapter II.

3rd Day :—Morning—Running Chain over obstructed line. Chapter IV, Paragraph 10 walk in a straight line. Chapter IV, Paragraph 11—Trace a line. Chapter IV, Paragraph 12—Testing Chain Chapter IV, Paragraph 13.

Evening :—Right angled triangles and their properties—Chapter III.

4th Day :—Morning :—Cross staff—Construction and use—Chapter IV, Paragraphs 14 to 20.

Evening:—Exercises in Chapter III.

5th Day:—Morning:—Cross staff, Offset pole and standard pole—Chapter IV, Paragraph 21, Caution in use of instruments—Chapter IV, Paragraph 22.

6th Day Morning :—Use of cross staff—Further practice—Chapter IV, paragraphs 17 to 20.

Evening :—Method of plotting—Chapter VIII, paragraphs 7 and 8.

7th Day:—Revision—Weekly Test.

IInd Week—

1st Day Morning :—Field measurement—Rough Land sketch—Triangulation, Chapter VI, paragraphs 1 to 5.

Evening :—Enlargement and reduction—Chapter VIII.

2nd Day Morning :—Field Measurement—Triangulation and offset sub-divisions topo details—Chapter VI, paragraphs 6 to 11.

Evening:—Practice symbols of details—Village, Taluk and District Maps Preparation—Chapter, VIII paragraph 13.

3rd Day Morning:—Exception to the rule of triangulation Chapter VI paragraph 12.

Evening:—Area computation—Area squares—Chapter IX Paragraphs 1 to 3 exercises 1 to 4.

4th Day Morning:—Measurement of obstructed lines—Chapter VII, paragraphs 1 to 8.

Evening :—Calculation of areas—Chapter IX, paragraphs 4 to 10 and Exercises.

5th Day Morning :—Measurement of obstructed lines, Chapter VII, paragraphs 9 to 16.

Evening :—Calculation of Area—Chapter IX, paragraph 11 and exercise 1 to comparison, with the areas obtained by computation with area squares.

6th Day Morning :—Measurement of obstructed lines—Further practice of work done on the 4th and 5th Mornings.

Evening :—Calculation of Area—Chapter IX, paragraph 11 and application to the demonstration in field made in the morning.

7th Day :—Revision—Weekly test.

IIIrd Week—

1st Day Morning:—Demarcation—Classification of Land. Chapter V.

Evening :—Main steps in Survey Chapter X.

2nd Day Morning:—Measurement of subdivision of given area—Chapter XI paragraphs 24 to 26.

Evening :—Preparation of "D" Sketch and stone account Closing of stone account.

3rd Day Morning :—Replacement of missing stones—Chapter X. Great emphasis should be placed in tracing replacement of terminals when a few of the offset stones (or point) are available as these are likely to be met with by the Surveyors in this area during supplemental Survey.

Evening :—Formalities under the Act—Chapter X.

4th Day Morning :—Location-Identification of Revenue Fields—formation of Fields and subdivisions—Preparation of location sketches—Initial Survey and Resurvey.

Evening :—Preparation of Land Register—Correlation Statement for Initial Survey—Correlations will be with reference to Paimash, Local names of fields.

5th Day Morning :—Measurement of a field with a fair number of subdivisions.

Evening:—Plotting of the field measured in the morning and computation of areas, Calculations of 'F' with reference to 'G' and Offsets.

6th Day Morning :—Same as the 5th Day dealing with another Field.

7th Day:—Revision and weekly Test.

Every seventh day of each week will be for revision of the lesson and work done during the week and a test held. The result of the tests should be tabulated to show the progress obtained by each candidate weekly.

4th Week:—Each batch will be allotted separate fields, for location, demarcation and measurement, etc., independently, close to each other all the seven batches is one block of survey totalling 80 Hectares, so as to be supervised by the instructor and instructed every day. The instructor will visit each batch daily.

(*b*) Plotting of work done in the morning and elucidation of any problems, etc., noticed in the morning and their explanations. The instructor will test the knowledge by putting practical questions, etc.

One month:—Each batch to be allotted independent blocks of 60 Hectares. The instructor should visit each batch twice a week or more as may be necessary for seeing whether the work is done properly and the students have rightly and correctly digested the instruction so far. On the expiry of the one month period of independent work, an examination both in practical and in theory will be held for all the candidates who have completed the course, and those declared as qualified on the results of the examination will be entertained as Field Surveyors and posted to Survey units for work.

1. *Instructions to the instructor of the schools.*—They should maintain register of attendance noting the names of the candidates reporting to them for duty.

2. The candidates should be divided into seven batches of four each, each batch to consist of balanced intelligence and physical endurance.

3. He shall maintain an account for the stores stationery, etc., issued for the school, showing receipt and expenditure, etc.

4. He will maintain a "Progress Register" of the candidates, allotting sufficient space to each candidate to note the daily progress, advance, set back to noticed in each individual's work and reaction survey work. It is necessary that the Instructors of the School maintain a Diary wherein, he will write up daily every stage and step which were taught to the candidates both in fields and in the afternoon in-door to see that the Syllabus is faithfully and fully carried out. Particulars are also required about the progress of the candidates, the backwards being selected for intensive coaching and special attention. These laggards will be put on extra work to makeup further deficiency so that they can catch up with the others.

No holiday or Sunday is permissible as the full course of training is to be completed within the period of two months so that the candidates may become eligible as quickly as possible.

5. The candidates also should write up diaries giving details with full explanations, the various and several items of work done through each day, these diaries should be checked and initialled by the Instructor before the class is dispersed in the evening.

The class will be from 7-30 a.m. to 12 noon in the mornings in field and 2 to 3 p.m. in the evenings which will be indoors but no rigid adherence to the exact times is to be adopted when it is necessary to do longer hours in the interest of work both in field and indoor.

6. Each Candidate will maintain rough note book to enter all the work and instructions given to him and will also show the practical work done in Field. He will also preserve all the records prepared by him during the first three weeks. The records prepared from 4th week onwards will be collected by the Instructor for credit towards the Outturn of the Survey Unit.

7. For stone planting work from 4th week Instructor will arrange coolies and pay them direct on obtaining vouchers. Towards this an out-turn statement is to be prepared where the cooly bill will be passed and the amount sent to him for payment.

APPENDIX XIII.

APPOINTMENT AND TRAINING OF ASSISTANT DIRECTOR OF SURVEY.

1. G.O. No. 2987, Revenue, dated 15th November 1951.

2. G.O. Ms. No. 3122, Revenue, dated 1st November 1954.

3. G.O. Ms. No. 698, Revenue, dated 4th March 1955.

Appointment to the post of Assistant Director of Survey and Land Records will be made by recruitment by transfer from among the Inspectors of Survey and Land Records in the Tamil Nadu Survey and Land Records Subordinate Service or

If no such qualified and suitable candidate is available, direct recruitment in accordance with the Tamil Nadu Survey and Land Records Service rules.

A probationary Assistant Director of Survey and Land Records recruited by transfer, shall within the prescribed period of probation undergo a course of Training in Settlement and Land Revenue work for a period of two weeks.

2. A directly recruited probationary Assistant Director will have to undergo the training specified below within a period not exceeding two years from the commencement of probation.

	Months.
Survey training including traverse computation training in Central Survey Office, Madras (as prescribed in Appendices XII and XIII of Survey Manual, Volume II)	15
Sub-section charge	1
Section Charge	3
Maintenance work	2
Settlement and Land Revenue work ...	Two weeks
Training in Office Manager's work	1

3. The probationer should within his term of probation pass the departmental Head Surveyor's and Inspector's Test.

Training in Maintenance work.

According to the revised course of training prescribed for the direct recruits in the category of Assistant Director, Survey and Land Records in G.O. Ms. No. 3122, Revenue, dated 1st November 1954, the Assistant Director of Survey and Land Records (direct recruits) will undergo training in maintenance work for a period of two months on completion of their training in section charge:—

They will be trained in the Districts where they are working. The Head Surveyors concerned should give them necessary instructions and assist them in their inspections of the villages and Taluk Offices. The Survey Unit Officers should give them preliminary instructions and then meet them every fort-night, test their knowledge and report the progress made in their training to the Board. The diaries of the Probationary Assistant Directors should be submitted to the Joint Director of Survey and Land Records through the Survey Unit Officers concerned before the 7th of the succeeding month without fail.

SYLLABUS FOR THE TRAINING IN MAINTENANCE WORK FOR PROBATIONARY ASSISTANT DIRECTORS OF SURVEY AND LAND RECORDS.

1st and 2nd Weeks:—Inspection of work of the Karnam and Maintenance Field Surveyor. Inspection of stones, renewals and sub-divisions

Inspection of village accounts maintained by the Karnam—Register A, B, Adangal, Chitta, enjoyment register, stone register, demarcation sketches, acknowledgement registers—Study of Manual of Village accounts and Chain Survey and Land Records Manual Chapter X of Part I—Procedure in Land Acquisition cases

3rd and 4th Week:—Field inspection of Town Survey in Towns and Street Survey in Panchayat areas—Examination of all the registers maintained by the Town and Panchayat Surveyors—Detailed inspection of the Town Surveyor's work in two towns and Panchayat Surveyors work in three Panchayats.

5th and 6th Week:—Study of Manual of Taluk Accounts—Examination of registers maintained in the Taluk Office (Special registers: 4, 5, 6, 7 and 8-A and register of sub-division Fees)—Study of Survey Advance Accounts in Appendix II of the Chain Survey and Land Records Manual Part II and all circulars (available with Survey Unit Officer) Examination of register V (a). V (b) Village War D.C.B. (Form VI) and Taluk D.C.B. (Form VII).

7th and 8th Week:—Inspection of the maintenance registers (4, 5, 6, 7, 8A and Survey Advance Accounts) in 3 Taluk Offices Examination of registers and maps maintained by the Head Surveyor.

SYLLABUS FOR THE TRAINING OF ASSISTANT DIRECTORS OF SURVEY AND LAND RECORDS (INCLUDING DIRECT RECRUITS) IN SETTLEMENT AND LAND REVENUE WORK.

An Assistant Director of Survey and Land Records will be posted for training for two weeks in the districts where settlement operations are in progress so that he may become acquainted with the general principles and methods of Land Revenue administration. The course of instruction will be as follows:—

First Week.

I. The study of the following books :—

(1) The standing orders of the Board of Revenue, Chapter I except the orders relating to mining, II, IV, VII, VIII, IX, XIV and XX (Orders 201, 202 and 202-A only).

(2) Revised Manuals of Village and Taluk Accounts.

(3) The Tamil Nadu (Abolition and Conversion into Ryotwari) Act XXVI of 1948.

(4) The Manual of Tamil Nadu Revenue Settlement Department by Thiru Lakshmikanta Rao.

(5) The Manual of Instructions for conducting resettlements by Thiru M. Audinarayanah Garu.

(6) Principles of Ryotwari Settlement by Thiru C. A. Ramakrishnan, I.C.S.

(7) The Resettlement Manual under the simplified system.

II. In addition to the reading of the above books by the Assistant Director of Survey, the Settlement Officer or the Assistant Settlement Officer will give him oral instructions on the connected subjects during the whole of the first week.

Second Week.

III. In the second week, two days may be spent in explaining the various accounts and registers prepared and maintained during the settlement operations and another three days in settlement field work.

At the end of the course, the Settlement Officer should examine the Assistant Director in the subjects prescribed above and report the result to the Board of Revenue.

APPENDIX No. XIV A

REFERENCE SHEET OF TOPOGRAPHICAL DETAILS APPEARING IN TALUK MAPS

No.	Item		As reduced to Scale 1 : 50000
1	Taluk name		GUDALUR
2	Collector's head quarters	(underlined thus)	══════════
3	Divisional Officer's head quarters	do.	――――――――
4	Tahsildar's head quarters	do.	— — — — —
5	Deputy Tahsildar's head quarters	do.	....
6	Development Block head quarters	do.	======
7	Villages with 5000 inhabitants and above		**KULATHUR**
8	Villages above 2001 to 4999 inhabitants		MANGALAM
9	Villages above 1001 to 2000 inhabitants		*SEMBEDU*

10	Villages above 501 to 1000 Inhabitants.	KULATHUR
11	Villages with 500 inhabitants and below	Sankari
12	Hamlet	*Settisonganur*
13	Salt Factory	*Murthy Solt Factory*
14	River name	*BHAVANI RIVER*
15	Municipality	M.
16	Urban areas under the jurisdiction of Panchayat Boards	U.
17	Town or Village site	
18	Inam	(I)
19	Local body rest house	LBR.
20	Post Office	P.
21	Police Station, Police out post	S. OP.

22	Hospital, Veterinary Hospital	H.
23	Dispensary	D.
24	Telegraph Office in other than Railway Station	T.
25	Encamping ground	EG.
26	Fort	
27	Traveller's bungalow or Local bodies rest house	R.
28	Public Works Department bungalow or rest house	B.
29	Forest bungalow or rest house	FB.
30	Registration office	RO.
31	Local bodies choultry	LBC.
32	Private choultry	PC.
33	Light house	

34 State boundary

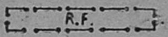
35 District boundary

36 Taluk boundary

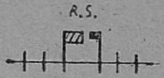
37 Village boundary

38 Municipal boundary

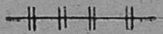
39 Reserved forest area



40 Railway line with station (Single line)



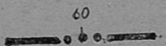
41 Railway line with station (Double line)



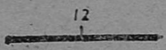
42 Telegraph line

43 National highways with mile stone

44 State highways with mile stone

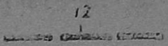


45 Major District roads with mile stone

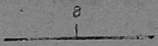


TALUK MAPS.

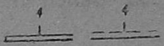
46 Other District roads with mile stone



47 Village roads with mile stone

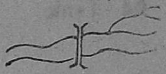


48 Metalled, Concrete and black top road, Unmetalled or gravelled, Earthen and forest roads with mile stone } (Unmaintained)



49 Cart track, Foot path

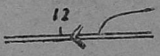
50 River & Stream with bridge



51 Channel and Dam

52 Anicut

53 Canal and lock with distributory and mile stone }



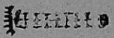
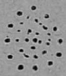
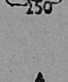
54 Ferry

Ferry

55 Temple

56 Mosque

57 Church

58 Rifle range	
59 Civil Aerodrome and landing ground	
60 Bench mark	B. M. 192·27
61 Deserted village	×
62 Tank	
63 Swamp	
64 Salt pan	
65 Sand	
66 Contours are approximate and at 50 or 250 feet intervals	
67 Great Trigonometrical station and height in feet above sea level	5575 Kusamalai h. s.
68 Forest inspection shed, Estate bungalow	IS. EB.
69 Madras Survey Trigonometrical station and height in feet above sea level	3642 Gudur H.

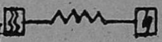
70 Telephone line with station

71 Unbridged crossings which are easily fordable except at high flood times } X

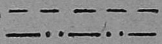
72 Crossings passable in dry weather but often impossible to ford in wet weather }

73 Crossings which are generally unfordable except for country carts in dry weather }

74 Telephone exchange

75 Electric transmission line with power house & sub-station } 

76 Inspection bungalow or camp shed IB.

77 Muri boundary, Nad boundary or Coffee or Tea estate boundary } 

78 Hill limit boundary

79 Rest shed, Lascars shed, RS. LS.

80 Land customs stations LCS.

81 Land customs out gates LCO.

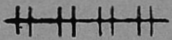
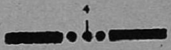
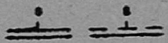
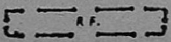
TAMIL NADU SURVEY MANUAL 2nd VOLUME.

CHAPTER XXII APPENDIX No. XIV B

REFERENCE SHEET OF TOPOGRAPHICAL DETAILS APPEARING IN DISTRICT TOURING MAPS

No.	Item		As reduced to 1 : 125000 & 250000
1	District name		SALEM
2	Taluk name		ATTUR.
3	Kundahs or hill name		MUNANAD ..
4	Collector's head quarters	(underlined thus)	═══════
5	Divisional Officer's head quarters	do.	________
6	Tahsildar's head quarters	do.	— — — — —
7	Deputy Tahsildar's head quarters	do.	....
8	Development Blocks head quarters	do.	= = = = =
9	Villages with 5000 Inhabitants and upwards		HARUR
10	Other Villages		Ponneri

11	Salt Factory	Salt factory
12	River name	CAUVERY RIVER
13	Urban areas under the jurisdiction of Panchayat Board	U.
14	Hospital, Dispensary, Police Station	H D. S.
15	Telegraph Office in other than Railway Station	T
16	Hospital or Veterinary Hospital	H. V.
17	Traveller's bungalow or Local bodies rest house Inspection shed	R. IS
18	Public Works Department bungalow or rest house	B.
19	Forest bungalow or rest house	F
20	Local bodies rest house	LBK.
21	Local fund choultry, Encamping ground, out-post Police Station	L. EG. OP.
22	Private choultry, Mission bungalow, Camp shed	C MS. CS.

23	Salt bungalow, Agency rest house	SB. AR.
24	Railway line with station (Single line)	
25	Railway line with station (Double line)	
26	Telegraph line	
27	National highways with mile stone	
28	State highways with mile stone	
29	Major District roads with mile stone	
30	Other District roads with mile stone	
31	Village roads with mile stone	
32	Metalled, Concrete and black top road, Unmetalled or gravelled, Earthen and forest roads with mile stone } (Unmaintained)	
33	Cart track	
34	Reserved forest boundary with area	

35 State boundary . . . .

36 District boundary — — · · · — —

37 Taluk boundary — — — — — —

38 Nad boundary —··—·—

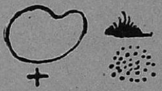
39 Municipal boundary ————

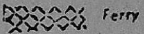
40 River and Stream with bridge

41 Channel and Dam —+—

42 Anicut

43 Canal and lock with mile stone

44 Tank, Swamp, Spring and Sand 

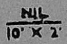
45 Salt pan, Ferry 

46 Town or Village site, Light house, Fort

47 Great Trigonometrical station and height in feet above sea level

48 Madras Survey Trigonometrical station and height in feet above sea level

49 Width and Depth of the river in dry and wet weather at the crossing point



50 Telephone line with station

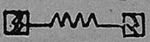
51 Unbridged crossings which are easily fordable except at high flood times — X

52 Crossings passable in dry weather but often impossible to ford in wet weather

53 Crossings which are generally unfordable except for country carts in dry weather

54 Telephone exchange

55 Electric transmission line with power house & sub-station



56 Civil Aerodrome and landing ground

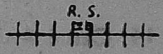
57 Municipality — M.

58 Post Office — P.

TAMIL NADU SURVEY MANUAL 2nd VOLUME.

CHAPTER XXII APPENDIX No. XIV C

REFERENCE SHEET OF TOPOGRAPHICAL DETAILS APPEARING IN DISTRICT ATLAS

No.	Item	As appears in the final print
1	District boundary	— . — . —
2	Taluk boundary	. . . .
3	Railway line with station (Single line)	
4	Railway line with station (Double line)	
5	National highways with unbridged sections	
6	State highways with unbridged sections	
7	Major District roads with unbridged sections	

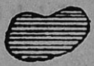
8 Other District roads with unbridged sections

9 Village roads

10 Unmetalled or Gravelled roads

11 Cart track

12 River, Channel, Bridge and Anicut

13 Tank 

14 Canal with lock

15 Traveller's bungalow • Velur

16 Light house ★

17 Contours (Approximate)

18 G. T. Station and height in feet above sea level ▲ 10

19 Swamp

20 Sand

21 Civil Aerodrome and landing ground

22 District head quarters SALEM

23 Divisional head quarters HOSUR

24 Taluk head quarters ATTUR

25 Deputy Tahsildars' head quarters *PARAMATI*

26 Development block head quarters (Underlined thus) = = = = =

APPENDIX No. XV.

OUTTURN AND PAY OF SURVEYORS.

1. In order to ascertain the actual outturn of a Surveyor, Deputy Surveyor and Draftsman, their work should be subjected to careful scrutiny once a month in the manner explained below. However, to ensure good quality and steady progress of work in field and to avoid accumulation of record work, the Deputy|Assistant Director of Survey shall enforce periodical check of records by the Range Deputy Surveyors with the diaries at every week end during the course of the Survey work.

2. On such date or dates between the 1st and the 5th of the month as may be fixed by the Deputy|Assistant Director of Survey, all field surveyors and Range Deputy Surveyors should be assembled at convenient centres. The Surveyors should bring all their records and diary books with them.

3. If for good and sufficient reason, such as sickness or absence on leave, a Field Surveyor cannot attend the centre, the Range Deputy Surveyor should bring the Field Surveyor's records to the centre.

The centre-time should not be prolonged owing to the absence of Surveyors nor should any Surveyor be detained ordinarily for more than two days.

4. Each Unit has generally two Gazetted Officers and eight Upper Subordinates. The Gazetted Officers and two or more Upper Subordinates, as may be necessary, should each conduct the scrutiny at one of the centres mentioned above.

5. The outturn of each Field Surveyor as reported in his diaries for the month, should be checked with the records but only so much of it, as is represented by records completed in every respect should be accepted as the month's outturn.

6. At centre check the Range Deputy Surveyor should present a statement in Survey Form No. 61 for verification by the inspecting officer and submission by that Officer to the Deputy/ Assistant Director.

7. Disciplinary action should be taken for continued short fall in the outturn. The centre check and House Rent Allowances due must be passed by the Deputy/Assistant Director to aviod omissions in their drawal.

8. Centre check should go by turns, i.e., the same officer should not check the same Surveyor's records at any two consecutive centres.

9. The work turned out by the Draftsman and Deputy Surveyor should also be checked up with reference to their diaries and records.

APPENDIX No. XVI.

List of Sub-processes.

Initial Survey and Re-survey.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
A—Boundary Demarcation.	1-A	Demarcation of village boundaries including line clearance.	Field Surveyor ..	5-I Class or 15-II class stones.
	1-B	Inspection of A work.	Inspector of Survey and Land Records, Head Surveyor or Deputy Surveyor.	16 stones.
B—Traverse Survey.	2	Survey of Main Circuits ..	Head or Deputy Surveyor.	10 stations or 3·2 kilometres including rechaining.
	3	Observation for Azimuth ..	Head Surveyor or Inspector of Survey.	4 sights at 2 stations.
	4-A	Survey of Village and Khandam Circuits.	Deputy or Field Surveyor.	10 stations or 3·2 kilometres including re-chaining.

B—Traverse Survey—*cont*.	4-B	Refixing Theodolite Stations.	Deputy or Field Surveyor.	3 stations.
C—Traverse Computation.	5-A	Examination of Traverse Field Books.	Junior Computor Draftsman.	162 stations.
	5-B	Overcheck of this sub-process.	Senior Computor Draftsman.	15 per cent.
	6	Computation of observation for azimuth (first or second time).	Junior Computor Draftsman.	4 sights.
	7	Comparison of computation for Azimuth.	Do.	8 sights.
	8	Computation of convergency of meridian (first or second time).	Do.	17 stations.
	9	Comparing computations of convergency.	Do.	32 stations.
	10	Computation of rectangular or Spherical Co-ordinates (first or second time).	Do.	8 G.T. stations.
	11	Comparison of computation.	Do.	17 G.T. stations.
	12	Examining angles of a triangle and calculating distances.	Do.	17 stations.

APPENDIX No. XVI—*cont.*

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
C—Traverse Computation —*cont.*	13	Examining calculations	Junior Computor Draftsman.	21 stations.
	14	Setting up and totalling angles.	Do.	323 stations.
	15	Examining setting up and totals and correcting angles.	Do.	377 stations.
	16	Working bearings ..	Do.	538 stations.
	17	Examining bearings ..	Do.	754 stations.
	18	Copying working lines ..	Do.	437 stations.
	19	Comparing working lines ..	Do.	646 stations.
	20	Working distances (first or second time)	Do.	162 stations.
	21	Comparing distances ..	Do.	431 stations.
	22	Totalling distances ..	Do.	538 stations.
	23	Examining totals ..	Do.	538 stations.

C—Traverse Computation —*cont*	24	Preparing correction field book.	Junior Draftman.	Computor	108 stations.
	25	Examining correction field book.	Do.		162 stations.
	26	Correcting distances ..	Do.		538 stations.
	27	Correcting original field books according to traverse sheets and correction field book.	Do.		162 stations.
	28	Entering fair lines ..	Do.		538 stations.
	29	Working plotting lines ..	Do.		431 stations.
	30	Working traverse sums ..	Do.		646 stations.
	31	Examining traverse sums ..	Do.		861 stations.
	32	Working products (first or second time).	Do.		216 stations.
	33	Comparing products ..	Do.		323 stations.
	34	Totalling products and calculating area.	Do.		538 stations.
	35-A	Examining totals and area ..	Do.		538 stations.
	35-B	Attending corrections ..	Do.		15 stations.
	35-C	Comparing corrections.	Do.		30 stations.

APPENDIX No. XVI—*cont.*

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
D—Traverse Plotting.	36-A	Squaring of sheets	Junior Computor Draftsman.	6 sheets.
	36-B	Examining squaring of sheets.	Do.	12 sheets.
	36-C	Traverse Plotting ..	Do.	188 stations.
	36-D	Examining plotting ..	Do.	188 stations.
	37-A	Plotting offsets ..	Do.	162 offsets.
	37-B	Preparing offset field books ..	Do.	431 units.
	37-C	Comparing offset field books.	Do.	861 units.
	37-D	Preparing Test correction sketches.	Do.	32 stations.
	38	Plotting with protractor ..	Do.	162 stations.
E and F—Demarcation and measurement of fields.	39-A	Location	Field Surveyor ..	50 items or (20 Hectares).
	39-B	Demarcation	Do.	30 stones.

E and F—Demarcation and measurement of Fields—*cont*.	39-C	Measurement of Fields ..	Field Surveyor ..	The outturn is in Hectares— Varying for different localities with reference to the linear measurement and stones required in a square kilometre.
	40-A	Inspection of location ...	Inspector of Survey and Land Records, Deputy Surveyor or Head Surveyor.	100 items.
	40-B	Inspection of Demarcation and measurement.	Do.	3·2 k.m. of measurement 8 k.m. of check by calculation including checking demarcation.
G—Plotting and inking of Village Map.	41-A	Comparing original and duplicate field measurement books and preparing discrepancy lists.	Junior Computor Draftsman.	43 fields.
	41-B	Preparing correlation Statement	Do.	500 lines.
	41-C	Checking correlation statement	Do.	1,000 lines.
	41-D	Preparing Combined map	Do.	129 Fields.

APPENDIX No. XVI—*cont.*

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
G—Plotting and Inking of Village Map —*cont.*	41-E	Preparing location sketches ..	Junior Computor Draftsman.	60 Fields or 400 sub-divisions.
	41-F	Comparison of location sketches	Do.	120 fields or 800 sub-divisions.
	42	Plotting fields in village map	Do.	43 fields.
	43	Testing, plotting and preparing lists for correction.	Do.	344 fields. Only 25 per cent of these will be tested.
	44	Plotting topographical details in pencil.	Do.	129 fields.
	45-A	Comparing maps	Do.	11 square miles (28·49 sq. km.)
	45-B	Comparison of measurements	Do.	86 fields.
	45-C	Preparation of correction shapes	Do.	21 fields.

G—Plotting and Inking of Village Map —*cont.*	46	Correcting field measurement book and village map as per correction lists received from field (only about 5 percent will require correction.)	Junior Computor Draftman.	43 Fields.
	47	Preparing tracings for comparison with side village maps.	Do.	11 Sheets.
	48	Inking field boundaries in village map.	Do.	270 Fields.
	49	Typing field numbers in Village map.	Typographer ..	270 Field numbers.
	50	Plotting small fields on a large scale, inclusive of inking boundaries and typing numbers. (only about 3 per cent of the fields will require enlargement)	Junior Computor Draftsman.	27 Fields.
H—Finishing Village Map and Area Computation.	51	Computing Areas of fields and sub-divisions with the area square in the field measurement book. (first or second time.)	Do.	215 Fields and sub-divisions or 431 acres. (175 Hectares.)
	52	Comparing first and second computations and preparing lists for third computations.	Do.	808 Fields and sub-divisions.

APPENDIX No. XVI—*cont.*

Name of process. (1)	*Sub-process number.* (2)	*Description of sub-process.* (3)	*Rank of men to be employed.* (4)	*Average daily outturn.* (5)
H—Finishing Village Map and area Computation —*cont.*	53	Computing areas third time (only about 10 per cent will require third computation).	Junior Computor Draftsman.	323 acres/131 hectares or 162 fields and sub-divisions.
	54	Comparing first, second and third computations and closing areas (only about 10 per cent will require comparison).	Do.	538 fields and sub-divisions.
	55	Computing areas of fields with the computing scale of village map.	Do.	861 acres/348 hectares.
	56	Comparing computing scale areas (S. P. 55) with area square areas (S. P. 54) and preparing lists for recomputation.	Do.	538 fields.
	57	Recomputing areas on village map (only about 10 per cent will require recomputation).	Do.	646 acres/261 hectares.

H—Finishing Village Map and area Computation —*cont.*	58	Examining plotting and area computation in field measurement book and village map and closing areas (only about 5 per cent will require examination)	Junior Computor Draftman.	17 fields.
	59	Computing offset areas (first or second time.)	Do.	215 stations.
	60	Comparing offset area computations.	Do.	646 stations.
	61	Preparing offset area list ..	Do.	538 stations.
	62	Examining offset area list ..	Do.	538 stations.
	63	Preparing rough area list and totalling areas.	Do.	1,077 fields and sub-divisions.
	64	Examining rough area list and comparing the total field area with the traverse area of the village.	Do.	1,615 fields and sub-divisions.
	65	Preparing fair area list and examining totals.	Junior Computor Draftsman.	1,292 fields and sub-divisions.
	66	Entering correct areas in both original and duplicate field measurement books.	Do.	538 fields.

APPENDIX XVI—*cont.*

Name of process. (1)	*Sub-process number.* (2)	*Description of sub-process.* (3)	*Rank of men to be employed.* (4)	*Average daily outturn.* (5)
H. Finishing Village Map and Area computation *cont*	67	Entering correct areas in field register.	Junior Computor Draftsman	538 fields and sub-divisions.
	68	Comparing areas in field measurement book (original and duplicate) field register and fair area list.	Do.	808 fields and sub-divisions.
	69	Examining details entered in pencil (S. P. 44) and inking them.	Do.	538 acres/233 hectares.
	70	Printing heading and side names in village map (10 names per square mile).	Typographer	27 Names.
	71	Final examination of village map and records.	Head Draftsman	6·48 square kilometres subject to a minimum of 270 fields.
	72A	Plotting sub-divisions	Junior Computor Draftsman.	65 sub-divisions.
	72-B	Testing of plotting sub-divisions	Do.	129 sub-divisions.

H.—Finishing Village Map and Area Computation —*cont*.	73	Computing areas of sub-divisions (first or second time.)	Junior Computor Draftsman.	215 sub-divisions
	74	Comparing first and second computations.	Do.	538 sub-divisions.
	75	Preparing supplemental area lists, rough and fair and entering areas in supplemental field register.	Do.	538 sub-divisions
	76	Comparing rough and fair area lists and supplemental field register.	Do.	646 sub-divisions.

LIST OF SUPPLEMENTAL SUB-PROCESSES—INITIAL SURVEY AND RE-SURVEY

G.-Plotting and inking.	S-1	Preparation of Triplicate Field Measurement Book.	Junior Computor Draftsman.	15 fields or 129 sub-divisions or 172 offsets or 86 stations.
Do.	S-2	Comparing of Triplicate Field Measurement book.	Do.	30 fields or 258 sub-divisions or 342 offsets or 172 stations.
C.-Traverse computation.	S-3	Copying traverse field books ..	Do.	431 Units (a unit is an angle or a distance.)
Do.	S-4	Comparing traverse field book	Do.	646 Units (a unit is an angle or a distance).

APPENDIX XVI—*cont.*

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
		SUPPLEMENTAL SURVEY.		
E & F Demarcation and Measurement of fields.	39-A	Location	Field Surveyor	60 subdivisions.
	39-B	Perambulation of maintainable stones.	Do.	100 stones.
	39-C	Renewal of missing stones ..	Do. ..	10 stones.
	39-D	Measurement of supplemental subdivisions.	Do. ..	10 subdivisions.
	40-A	Inspection of Location ..	Inspector of Survey and Land Records, Head Surveyor or Deputy Surveyor.	75 items.
	40-B	Inspection of refixing of missing stones and measurement of sub-divisions.	Do. ..	100 chains (2·01 kilometres of remeasurement and 40 chains 0·8 kilometres) by calculation.

G—Plotting and inking of village map.	41-A	Preliminary comparison of supplemental subdivisions incorporated.	Jr. Computor Draftsman.	323 Subdivisions.
	41-B	Preparation of correlation statement.	Do. ..	500 subdivisions.
	41-C	Checking of correlation statement.	Do. ..	1,000 subdivisions.
	41-D	Preparation of location sketches	Do. ..	60 fields or 400 subdivisions.
	41-E	Comparison of location sketches	Do.	120 fields or 800 subdivisions.
	42	Incorporation of the new subdivisions in the original and duplicate field measurement book.	Do. ..	65 subdivisions.
	43	Testing plotting	Do. ..	130 subdivisions.
	44	Plotting of topographical details in pencil in the village map.	Do. ..	129 fields.
	45	Preparation of correction shapes	Do. ..	21 fields.

SUPPLEMENTAL SURVEY—*cont.*

Name of process. (1)	*Sub-process number.* (2)	*Description of sub-process.* (3)	*Rank of men to be employed.* (4)	*Average daily outturn.* (5)
G—Plotting and Inking of Village Map—*cont.*	46-A	Correcting Field Measurement Book and village map as per correction lists received from field.	Junior Computor Draftsman. ..	43 fields.
	46-B	Grouping corrections	Do. ..	300 subdivisions.
H—Finishing village map and area computation.	51	Area computation 1st or 2nd time.	Do. ..	215 fields and sub-divisions. .. 431 acres or 175 hectares.
	52	Comparing first and second time computations.	Do. ..	808 fields and sub-divisions.
	53	Computing areas for third time	Do. ..	162 fields and sub-divisions.
	54	Comparing first, second and third computations and adjustment.	Do. ..	538 fields and sub-divisions.

H—Finishing Village map and area Computation —*cont.*	63	Preparing rough area list and totalling areas.	Junior Computor Draftsman. ..	1,077 fields and sub-divisions.
	64	Examining rough area lists and totals.	Do. ..	1,615 fields and sub-divisions.
	65	Preparing Fair Area list and totals.	Do. ..	1,292 fields and sub-divisions.
	67	Entering correct areas in field register.	Do. ..	538 fields and sub-divisions.
	68	General Comparison of Field Measurement Book, field register and fair area lists.	Do. ..	808 subdivisions.
	69	Examining of details entered in the village map in pencil.	Do. ..	538 acres/233 hectares.
	70	Printing names, abstracts, reference and headings.	Do. ..	7·0 sq. kilometres (27 names).
	71	Final examination of village map and records.	Head Draftsman ..	6·4 sq. kilometres.
	72-A	Plotting of new subdivisions ..	Jr. Computor Draftsman.	65 subdivisions.
	72-B	Testing plotting of sub-divisions	Do. ..	129 subdivisions.
	73	Area computation (1st or 2nd time).	Jr. Computor Drafts man	215 subdivisions.

SUPPLEMENTAL SURVEY—*cont.*

Name of process. (1)	*Sub-process number.* (2)	*Description of sub-process.* (3)	*Rank of men to be employed.* (4)	*Average daily outturn.* (5)
H—Finishing Village Map and area Computation —*cont.*	74-A	Comparing first and second time computation.	Jr. Computor Draftsman. ..	538 subdivisions.
	74-B	Area computation third time	Do. ..	215 subdivisions.
	74-C	Adjustment of areas	Do. ..	538 subdivisions.
	75	Preparation of supplemental area lists rough and fair and entering areas in supplemental field register.	Do. ..	538 subdivisions.
	76	Comparing rough and fair area list and supplemental field register.	Do. ..	646 subdivisions.

LIST OF SUB-PROCESSES—SUPPLEMENTAL SURVEY.

G—Plotting and Inking.	S1	Preparation of Triplicate field measurement book.	Jr. Computor Draftsman.	15 fields or 129 subdivisions or 172 offsets or 86 stations.

G—Plotting and Inking —*cont.*	S2	Comparison of Triplicate field measurement book.	Junior Computor Draftman.	30 fields or 258 subdivisions or 342 offsets or 172 stations.

PREPARATION OF 9(2) NOTICES.

	1	Examining the areas in the duplicate Field Measurement Book and Land Register as per Fair Area List.	Jr. Computor Draftsman.	1,150 for 3 Computor Draftsman.
	2	Preparation of 9(2) notices ..	Section writers ..	575 lines.
	2B	Comparison of 9(2) notices ..	Do. ..	1,150 lines.
	3A	Preparation of 9(2) acknowledgments.	Do ..	575 lines.
	3B	Comparison of 9(2) acknowledgments.	Do. ..	1,150 lines.
	4A	Preparation of common boundary sketches.	Jr. Computor Draftsman.	93 fields.
	4B	Comparison of common boundary sketches.	Do. ..	187 fields.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
		TOWN SURVEY.		
A—Boundary Demarcation	1	Demarcation of town, Ward and Block boundaries.	Deputy Surveyor ..	15 Stations.
	1A	Inspection	Deputy Surveyor or Head Surveyor.	30 Stations.
B—Traverse Survey.	2	Survey of Town and Ward boundaries.	Deputy Surveyor or Head Surveyor.	12 Stations or 5 Kilc metres.
	3	Observation for Azimuth ..	Head Surveyor or Inspector of Survey and Land Records.	4 sights at 2 stations.
	4-A	Survey of Block boundaries ..	Deputy or Field Surveyor.	12 stations or 1·5 to 2 miles (2·4 to 3·2 km)
	4-B	Refixing of traverse stations..	Do.	3 Stations.
C—Traverse Computation.	5	Examination of traverse field books.	Jr. Computor Draftsman.	162 Stations.

C-Traverse Computation—*cont.*	6	Computation of observation for azimuth (first or second time)	Junior Computor Draftsman.	4 Sights.
	7	Comparison of computation for azimuth.	Do.	8 sights.
	8	Setting up and totalling angles	Do.	323 Stations.
	9	Examining setting up and totals and correcting angles.	Do.	377 Stations.
	10	Working bearings	Do.	538 Stations.
	11	Examining bearings	Do.	754 Stations.
	12	Copying working lines	Do.	431 Stations.
	13	Comparing working lines ..	Do.	646 Stations.
	14	Working distance (first or second time).	Do.	162 Stations
	15	Comparing distance	Do.	431 Stations.
	16	Totalling distance	Do.	538 Stations.
	17	Examining totals	Do.	538 Stations.
	18	Preparing correction field book	Do.	108 Stations.

Name of process. (1)	*Sub-process number.* (2)	*Description of sub-process.* (3)	*Rank of men to be employed.* (4)	*Average daily outturn.* (5)
C—Traverse Computation —*cont.*	19	Examining correction field book.	Junior Computor Draftsman.	162 Stations.
	20	Correcting distances	Do.	538 Stations.
	21	Correcting original field books according to traverse sheets and correction field books.	Do.	162 Stations.
	22	Entering fair lines	Do.	538 Stations.
	23	Working plotting lines ..	Do.	431 Stations.
	24	Working traverse sums ..	Do.	646 Stations.
	25	Examining traverse sums ..	Do.	861 Stations.
	26	Working products (first or second time.)	Do.	215 Stations.
	27	Comparing products	Do.	323 Stations.

C—Traverse Computation —*cont.*	28	Totalling products and calculating area.	Junior Computor Draftman.	538 Stations.
	29	Examining totals and area ..	Do.	538 Stations.
D-Traverse plotting.	30	Traverse plotting	Do.	188 Stations.
	31	Examining traverse plotting.	Do.	215 Stations.
E & F Field Demarcation and Field Measurement.	32-A	Location	Field Surveyor	50 items or 50 Acres. or 20 Hectares
	32-B	Stone Planting	Do.	30 Stores.
	32-C	Measurement close Block ..	Do.	900 Metres.
	32-D	Measurement medium Block ..	Do.	1,500 metres.
	32-E	Measurement open block ..	Do.	2,400 Metres.
	33-A	Inspection of location and E .	Deputy Surveyor or Head Surveyor.	100 items.
	33-B	Inspection of measurement close block.	Do.	900 Metres.
	33-C	Inspection of measurement medium block.	Do.	1,500 metres.

Name of process. (1)	*Sub-process number.* (2)	*Description of sub-process.* (3)	*Rank of men to be employed.* (4)	*Average Daily outturn.* (5)
E & F Field Demarcation and Field Measurement—*cont.*	33-D	Inspection of measurement open block.	Deputy Surveyor or Head Surveyor.	2,400 metres.
G-Plotting Fair Block map.	34	Comparing field demarcation sketch and rough block map and preparing discrepancy lists.	Jr. Computor Drafts-man.	108 Fields.
	35	Comparing boundaries and measurements of side fields and side blocks and preparing discrepancy lists.	Jr. Computor Drafts-man.	86 fields
	36	Plotting fair block map, entering details and preparing discrepancy lists.	Do.	65 fields.
	37	Testing plotting of fair block map and preparing lists for correction.	Do.	129 fields.

G-Plotting **Fair Block** Map—*cont.*	38	Correcting rough and fair block maps and demarcation sketch as per correction lists received from field.	Jr. Computor Draftsman.	43 fields.
	39	Inking field boundaries and details.	Do.	86 fields.
	40	Examining field boundaries and details.	Do.	323 fields.
H-Finishing Map Computing area and preparing **Fair records.**	41	Deleted.		
	42	Deleted.		
	43	Typing field numbers in fair block map.	Typographer.	270 fields.
	44	Arithmetical calculation of areas of rectangular fields, payals and Koradus.	Jr. Computor Draftsman.	129 fields.
	45	Examining calculation of areas of rectangular fields, payals and Koradus.	Do.	215 fields.
	46	Computing areas of cadastrally surveyed fields with the area square (first or second time).	Do.	431 Acres/175 Hectares or 215 fields and subdivisions.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
H-Finishing Map computing area and preparing fair records.	47	Comparing first and second computations and preparing lists for third computation.	Jr. Computor Draftsman.	808 fields and subdivisions.
	48	Computing areas third time (only about 10 per cent will require third computation).	Do.	323 Acres/131 Hectares or 162 fields and subdivisions.
	49	Comparing first, second and third computations and closing areas (only about 10 percent will require comparison.)	Do.	538 fields and subdivisions.
	50	Converting area square areas into acres and square feet/ Hectares, ares and Square metres.	Do.	323 fields.
	51	Examining area square areas converted into acres and square feet/Hectares, ares and square metres.	Do.	431 fields.

H—Finishing Map, Computing area and preparing Fair records —*cont.*	52	Computing, with the computing scale, areas of fields other than rectangular or cadastrally surveyed(first or second time.)	Junior Computor Draftman.	Close blocks 4·8 Hectares, medium blocks 18 7 Hectares and open blocks 112 Hectares.
	53	Comparing first and second computations and preparing list for third computation.	Do.	808 fields.
	54	Computing areas third time. (Only about 10 per cent will require third computation).	Do.	Close blocks 3·12 Hectares, medium blocks 13·6 Hectares and open blocks 86 Hectares.
	55	Comparing first, second and third computations and closing areas.	Do.	538 Fields.
	56	Preparing final computation sheet of fields other than rectangular or cadastrally surveyed.	Do.	129 fields.
	57	Examining final computation sheet of fields other than rectangular or cadastrally surveyed.	Do.	215 fields.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
H—Finishing Map Computing area and preparing Fair records.—*cont.*	58	Preparing rough area list and totalling areas.	Junior Computor Draftman.	215 fields.
	59	Examining rough area list and totals.	Do.	431 fields.
	60	Calculating offset areas (first or Second time).	Do.	54 traverse distances.
	61	Comparing offset area calculations.	Do.	108 traverse distances.
	62	Preparing offset area list, totalling offset areas and completing the traverse area of each block.	Do.	431 traverse distances.
	63	Examining offset area list, totalling Offset areas and completing the traverse area of each block.	Jr. Computor Draftsman.	646 stations.
	64	Comparing traverse and field areas.	Do.	65 blocks.

H—Finishing Map Computing area and preparing Fair records—*cont.*	65	Preparing fair area list and examining totals.	Junior Computor Draftman.	431 fields.
	66A	Comparing fair area list ..	Do.	861 fields.
	66B	Entering the area in the field register.	Do.	538 fields.
	66C	Comparing the same ..	Do.	1077 fields.
	66D	Comparing the field register with the fair map and rough block map in respect of field boundaries and details.	Do.	323 fields.
	67	Preparing tracing in pencil for record of measurement (from demarcation sketch and rough and fair block maps.)	Do.	108 fields.
	68	Examining and inking the tracing.	Do.	108 fields.
	69	Entering field numbers and measurements in record of measurements.	Do.	32 fields.
	70	Examining field numbers and measurements in record of measurements.	Do.	81 fields.

Name of process.	*Sub-process number.*	*Description of sub-processes.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
Finishing Map computing area and preparing fair records-*cont.*	71	Printing heading, side names and names of streets in fair block map or in record of measurement.	Typographer	43 names.
	72	Preparing original fair field register and entering areas.	Do.	65 fields.
	73	Examining original fair field register.	Do.	129 fields.
	74	Copying duplicate fair field register.	Do.	108 fields.
	75	Comparing duplicate fair field register.	Do.	162 fields.
	76	Final examination of maps and records.	Head Draftsman	2 blocks.
		STREET SURVEY.		
A—Demarcation.	1	Demarcation of street Traverse points.	Field or Deputy Surveyor.	15 Stations.

	2	Inspection of A work	Deputy or Head Surveyor.	30 stations.
B—Traverse Survey.	3	Traverse Observation	Field Surveyor or Dy-Surveyor	12 stations
	4	Refixing traverse station ..	Do.	3 stations.
C—Traverse Computation.	5	Examination of traverse field books.	Jr. Computor Draftsman.	162 Stations.
	8	Setting up and totalling angles	Do.	323 Stations
	9	Examining setting up and totals and correcting angles.	Do.	377 Stations.
	10	Working bearings	Do.	538 Stations.
	11	Examining bearings ..	Junior Computor Draftsman.	754 stations.
	12	Copying working lines	Do.	431 stations.
	13	Comparing working lines ..	Do.	646 stations.
	14	Working distances (first or second time).	Do.	162 stations.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average dai'y outturn.*
(1)	(2)	(3)	(4)	(5)
C—Traverse Computation —*cont.*	15	Comparing distances	Junior Computor Draftsman.	431 stations.
	16	Totalling distances	Do.	538 stations.
	17	Examining totals	Do.	538 stations.
	18	Preparing correction field book.	Do.	108 stations.
	19	Examining correction field book.	Do.	162 stations.
	20	Correcting distances	Do.	538 stations.
	21	Correcting originals field books according to traverse sheets and correction field books.	Do.	162 stations.
	22	Entering fair lines	Do.	538 stations.
	23	Working plotting lines ...	Do.	431 Stations.

D—Traverse Plotting.	30A	Squaring of sheets	Jr. Computor Draftsman.	6 sheets.
	30B	Examining Squaring of sheets	Do.	6 sheets.
	30C	Traverse Plotting	Do.	188 stations.
E and F—Demarcation and measurement of field.	32A	Location	Field Surveyor or Deputy Surveyor.	100 side names with tar marks and pit.
	32B	Stone planting	Do.	30 stones
	32C	Tar Marks painting ..	Do.	80 stones.
	32D	Measurement	Do.	1·3 kilometres.
	33A	Inspection—Location and E	Deputy Surveyor or Head Surveyor.	4 fields.
	33B	Inspection—Measurement ..	Do.	1·3 kilometres.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily outturn.*
(1)	(2)	(3)	(4)	(5)
G—Plotting and Inking of Composite Map	41	1. Comparison of original and duplicate street field maps including verification of side field measurements, side names, tie line measurements, door numbers, etc. 2. Measurements of tie lines recorded in the street field atlas with reference to that noted in the tie line book. 3. Street names noted in the street field atlas with reference to the certified list furnished by the president or executive officer of the Panchayat Board and preparing discrepancy list.	Junior Computor Draftsman.	25 Street fields.
	41-A	Verification of cadastral Survey measurements when the street and Cadastral Survey boundaries are coterminus	Jr. Computor Draftsman.	25 Street fields.

	and listing out discrepancies including the verification of reconciliation sketches with connected records.		
41-B	Comparison of angles entered in the street field map with reference to final angles adopted in the traverse records and attending to corrections where necessary.	Junior Compu or Draftsman.	150 Stations.
42	Plotting of street fields in the composite maps in scale 1 mm. : 5,000 m.m. and preparing discrepancy list with the T.C. sketches.	Do.	25 Street Fields.
43	Testing plotting of street field maps (all fields) and certifying to the discrepancy list prepared in sub-process 42.	Do.	50 Street fields.
43-A	Preparation of test correction sketches.	Do.	32 Fields.
43-B	Attending to the corrections in all concerned records.	Do.	40 Fields.

Name of process.	*Sub-process number.*	*Description of sub-process.*	*Rank of men to be employed.*	*Average daily out-turn.*
(1)	(2)	(3)	(4)	(5)
G—Plotting and Inking of Composite Map—*cont.*	44	Tracing of cadastral Survey fields from the litho maps in respect of fields lying within the scheduled boundary and fitting them in the composite map so that the street fields coincide with the cadastral survey (in pencil).	Junior Computor Draftsman.	120 fields.
	45	Inserting old topo-details in pencil.	Do.	120 fields.
	46	Plotting fresh topo-details in pencil.	Do.	173 offsets.
	48-A	Inking field boundaries (Cadastral Survey).	Do.	270 fields.

G—Plotting and Inking of Composite Map —*cont.*	48-B	Inking (Street Fields) ..	Junior Computor Draftman.	150 fields.
	48-C	Inking topo-details ..	Do.	175 fields.
H—Finishing Composite Maps.	69	Typing field numbers . ..	Junior Computor Draftsman.	270 fields.
	71	Printing heading, side names, street names, and important topo-details, etc.	Typographer ..	27 Names.

Serial number and nature of work. (1)	*Daily outturn* (2)	*Remarks.* (3)
Scrutiny of the fresh main circuit records received from the unit officers for approval.		
1 Examining original 'B' Sketches and 'B' Field books.	168 stations.	..
2 Examining correction 'B' fieldbooks and 'B' sketches with reference to the eye sketches, taluk map, village 'B' field books and 'B' sketches.	75 stations.	..
3 Examining G. T. connection sketches, 'B' field books, rough and fair traverse sheets of the main circuit.	4 stations.	..
4 Final verification of the records regarding the defects noticed, entering discrepancies in the concerned registers and summarising the same after passing orders therein (Register) by the Deputy Director, Central Survey Office.	10 items	..
Checking periodical monthly returns received from unit offices regarding the process of main circuit work.		
5 Verification of the statement showing the progress of main circuit work dealt within the District units for the purpose of submitting review to the Board and noting the progress of work in the concerned register maintained in 'E' Section.	41 items.	

Serial number and nature of work.	*Daily outturn.*	*Remarks,*
(1)	(2)	(3)
Checking the periodical annual return regarding the condition of G T.. stations received from various Collectors of the district.		
6 Verification of the periodical annual return showing the condition of G.T. stations lying in all the Districts which will be received from the various Collectors and checking the particulars r garding L. No. and name of the villages, local name of the G. T. stations, etc., with reference to the printed list.	2 returns.	..
Supply of extracts for the common boundaries between two states.		
7 Verification of the records with reference to the traverse records field measurement books, village maps, etc., to see whether the traverse data required are available and furnishing of data.	399 units.	..
Frontier boundary work (FGO extracts.)		
8 Verification of the taluk maps, main circuit maps, traverse records, field measurement books, litho maps and joint verification sketches available if any with the sketches received from the Collector through the Board for renewal and repair etc.	399 units.	..

Serial number and nature of work.	*Daily outturn.*	*Remarks.*
(1)	(2)	(3)
Plotting of the Inter State Boundaries.		
9 Copying the angles and distances in the plotted sketches for the frontier boundary.	1080 units.	..
10 Comparing the above process ..	2160 units.	..
11 Inking the plotted lines for the frontier boundary.	200 stations.	..
12 Verifying the traverse records to find out the correct record in which the plottable data for the frontier boundary are available.	Miscellaneous.	..
Furnishing survey particulars for other sections.		
13 Verification of the initial and resurvey area registers, old and latest taluk maps to furnish the survey particulars (i.e. year and nature of Survey, location of the village, etc.,)	4 items.	..
Area reconciliation.		
14 Verification of area by traverse and by fields with area registers and entering the area by fields in the area register duly correcting the area by traverse if necessary.	20 items.	..
15 verification of angles and distances in the village map with the traverse sheet.	Miscellaneous.	..

Serial number and nature of work. (1)		*Daily outturn.* (2)	*Remarks.* (3)
	Preparation of descriptive list of G.T. stations lying in and around taluk and district.		
16	Preparation of statement showing the values and description of G.T. stations to be sent to the outside offices.	5 G.T. stations.	..
	Preparing of projection sheets.		
17	Working out trijunction values ..	538 stations.	..
18	Copying trijunction values ..	1080 units.	..
19	Verifying the traverse sheets of the villages and main circuit traverse to trace out the required data.	Miscellaneous.	..
20	Squaring the sheets for preparing the taluk maps.	4 sheets.	..
21	Plotting the trijunction points ..	25 stations.	
	Computing and examining and checking 'G' values in the original or black prints for reference to the taluk and district touring map.		
22	Measuring the original taluk maps and district touring map for calculating the number of sheets for which the 'G' values are to be computed and computing the 'G' values with reference to the auxiliary tables.	10 Diagonals.	..

Serial number and nature of work. (1)	*Daily outturn.* (2)	*Remarks.* (3)
Computiug, examining and checking 'G' values in the original or black prints for reference to the taluk and district touring map—cont.		
23 Examining the 'G' values ..	10 Diagonals.	..
24 Checking the 'G' values (Square by square with diagonals) in original or black print and checking of other squares, if any discrepancies noted during checking of 'G' lines.	6 Diagonals.	..
25 Preparation of field sketches showing the required boundary indicating therein the chain and offset measurements along with the concerned diagonal line andfield boundary measurement from the field measurement books.	30 fields	..
26 Comparison of the field sketches referred to in the above item.	60 fields.	..
Conversion of F.P. measurements into metric measurements inthe traverse sheets.		
27 Conversion of measurements into metric units in the Traverse sheets.	500 items	..
28 Conversion of figures in col. No. 5, 14, and 15 into metric units to plot the map in the scale of 1 : 5,000.	1000 items.	..
29 Comparison of the process noted in item above.	1000 items.	..
30 Mending traverse sheets, and **Khandam Traverse Sheets.**	20 sheets.	

Serial number and nature of work.	Daily outturn.	Remarks.
(1)	(2)	(3)
Conversion of F.P. measurements into metric measurements in the traverse sheets—cont.		
31 Substituting figures in the traverse sheets.	200 items	..
32 Comparing the figures substituted in the traverse sheets.	300 items.	
33 Mending of (maps) sheets ..	8 villages.	..
34 Copying (preparation from the traverse sheets, Khandam sheets and traverse field books)	431 units field book 1080 units traverse sheet.	..
35 Comparing the traverse sheets Khandam traverse and traverse field books.	861 units field book 2160 units traverse sheet.	..
36 Preparing (taking true extracts) from the 'B' sketch.	108 stations.	..
37 Comparing 'B' sketches	215 stations.	..
38 Copying Nautical Alamanac ..	7 months.	..
39 Comparing Nautical Alamanac ..	15 months	..
Preparation of area register.		
40 Preparing indents for the supply of village maps.	400 group villages.	..
41 Arranging the grouped villages in alphabetical order with reference to the spelling in the alphabetical book	200 group villages.	..

Serial number and nature of work. (1)		Daily outturn. (2)	Remarks. (3)
	Preparation of area register—cont.		
42	Comparing the list of villages arranged in the alphabetical order.	300 names.	..
43	Stitching the area register with sufficient number of sheets according to the number of villages and units comprised in the taluk and drawing necessary column and heading.	150 pages.	..
44	Copying the village number and names of the group villages and their units, etc., in the new area register in columns 3 and 10 already arranged in the alphabetical order. The columns 1, 2, 8 and 9 have to be filled up by the same C. D. simultaneously.	200 names.	..
45	Comparing the above process with reference to the group list and alphabetical list.	400 names.	..
46	Entering the Village number and name, year of survey, old area and total area in column numbers 12to 20 with reference to the estate area register and initial survey area register.	150 unit villages	..
47	Comparing the above process ..	300 unit villages	..
48	Entering the traverse area, field war area, nature of survey and year of survey particulars in columns Nos. 4 to 7 and 11 with reference to the village maps.	100 group villages	..

Serial number and nature of work. (1)		*Daily outturn.* (2)	*Remarks.* (3)
	Preparation of area register—cont.		
49	Comparing the above process ..	200 group villages.	..
50	Totalling the area for the group villages and units with page war abstract and working out the difference between the original area and latest area of each village.	400 units.	..
51	Comparing the above process ..	450 units.	.
	Area reconciliation.		
52	Checking the area by traverse furnished by the J.D.S & L.Rs. (as furnished to the census Department) with the area register.	300 villages	..
53	Comparing the above process ..	300 villages.	.
54	Preparing discrepancy list ..	200 villages.	.
55	Comparing the above process ..	300 villages.	.
56	Checking the areas with reference to the village maps.	100 villages.	.
57	Verifying the traverse records, village maps., R. S. R. and field measurement books for area reconciliation.	Miscellaneous	..
	Computation of areas.		
58	Computation of areas on the taluk maps with computing scale.	15 squares.	..

Serial number and nature of work.	*Daily outturn.*	*Remarks.*
(1)	(2)	(3)
Town Survey.		
1 Finalling the fair block maps, rough block maps, 'D' sketch, rough and fair area list—		
1 Close	1 Block	
2 Medium	1 Block	
3 Open	2 Blocks	
2 Error passing with Sr.D/man. H.D. and 1. Rough Block map 2. Fair Block map 3. Record of Measurement Tracings 4. D. sketch.	M.T.—100 items (25 × 4)	
3 Attending corrections in all the records as per the error list.	50 corrections.	
4 Removing incorrect lines, details, etc., in the R:M.Ts. & F.B. Map	15 items.	
5 Comparing the corrections as per the error list.	100 corrections.	
6 Touching up the fair block map	6 Blocks.	
7 Pasting imprints, heading, scale, area, side names, notification, survey particulars regarding No. Published by the printed fly slips.	24 items.	
8 Finalling the fair block maps	2 blocks.	
9 Attending correction after finalling done by senior draftsman.	50 corrections.	
10 Checking the final corrections	100 corrections.	
11 Mending the town survey records	8 sheets.	
12 Verifying the proof copies of Revenue block map.	4 blocks.	

Serial number and nature of work. (1)	Daily outturn. (2)	Remarks. (3)
Town Survey—cont.		
13 Tracing the field boundaries, sub-divisions, block boundary in the fresh R. M. Tracings.	100 fields.	
14 Inking the field boundaries, subdivision lines, block boudaries in the fresh R. M. Tracings.	100 fields.	
15 Figuring the Record of Measurement Tracings	30 fields.	
16 Touching up the pale names, lines etc., in the fresh R.M. Tracings.	2 blocks.	
17 Comparing the fields, block boundaries in the R. M. Tracings.	76 fields.	
18 Finalling the record of measurement tracings by Senior draftsman.	2 blocks.	
19 Attending corrections in the fresh R. M. Tracings.	50 corrections.	
20 Checking the attending correction by Senior Draftsman.	100 corrections.	
Preparation of fresh fair block map.		
21 Tracing the old original (Field boundaries, block boundary and details etc.,)	100 fields.	
22 Inking the field boundaries, block boundaries in the fresh fair block map.	100 fields.	
23 Inking the house details, streams, tanks, Railway lines, foot-path, cart track, Telegraph lines, etc., in the fresh fair block map.	2 Blocks.	
24 Comparing the fresh fair block map with original.	200 fields.	
25 Finalling the fresh fair block map with original map.	2 blocks.	

Serial number and nature of work. (1)	*Daily outturn.* (2)	*Remarks.* (3)
Town Survey—cont.		
Revision and reprinting of record of measurement tracings incorporation of supplemental survey of maintenance changes.		
26 Plotting the maintenance changes or supplemental survey changes in the R.M. Tracings and carrying out corrections as per the T.C. Sketches.	30 fields.	
27 Examining the plotting of maintenance changes and supplemental changes in the R. M. Tracing.	60 fields.	
28 Inking the maintenance and supplemental changes.	100 fields.	
29 Entering measurements as per the maintained copies.	30 fields.	
30 Entering measurements in the open block ..	150 units (each measurement 1 unit).	
31 Comparing R.M. Tracings (Close and Medium)	76 fields.	
32 Examining R.M. Tracing (Open block) ..	301 units.	
33 Preparation of correction sketches	8 fields.	
34 Comparison of correction sketches	16 fields.	
Preparation of original ward map.		
35 Compiling rough ward map or the traverse skeleton—		
1. ¼ reduction	8 Blocks.	
2. ½ Reduction	6 Blocks.	
3. Same scale	4 Blocks.	
36 Preparing ward boundary and touching up the linkage.	20 Blocks.	
37 Examining the rough original ward map ..	15 Blocks	

Serial number and nature of work. (1)		*Daily outturn.* (2)	*Remarks.* (3)

Town Survey—cont.

Praparation of original ward map—cont.

38	Penciling the house details in the ward map	1 Block.	
39	Preparing list of names to be typed in the ward map from the Revenue Block Map.	150 names	
40	Examining the list of names prepared for typing.	301 names.	
41	Giving numbers for the names to be typed in the map for the guidance in 'I' section	60 Names.	
42	Penciling the block boundary in the light blue print of ward map.	6 Blocks.	
43	Inking the block boundaries in the fair original ward map.	6 Blocks.	
44	Inking the field boundaries in the fair original ward map.	150 fields.	
45	Inking details in the ward map	2 Blocks.	
46	Inking the Railway lines, tanks, rivers, channels, culvert, burial ground, etc.	½ sheet per day.	
47	Inserting the heading, scale, border lines, key, reference, etc.	2 sheets.	
48	Inking the heading, scale, border lines, key, reference, etc.	2 sheets.	
49	Examining the fair original ward map completed.	3 Blocks.	
50	Touching up the pale lines, names, etc., in the ward map.	3 sheets.	
51	Finalling the fair original ward map ..	6 Blocks.	
52	Attending corrections after finalling done by the Senior Draftsman.	50 corrections.	
53	Verifying the proof copies with original ward map.	1 ward per day.	

Serial number and nature of work. (1)	Daily outturn. (2)	Remarks (3)
Town Suvrey—cont.		
Preparation of Original Town Map		
54 Compiling the Rough Town map	2 wards.	
55 Examining the rough Town map	5 wards.	
56 Tracing from the rough original	1/15 sq. miles.	
57 Comparing and correcting lines wherever necessary.	1 ward.	
58 Penciling the ward boundary, etc.	3 wards.	
59 Examining the names after typing in the fair original.	200 names.	
60 Pentagraphing the surrounding villages for marking environs.—		
a. Single reduction	5,000 acres.	
b. Double reduction	2,501 acres.	
61 Examining the environ portions	5,000 acres	
62 Tracing the village map for insertion in the Town map (16"=1 mile).	231 fields	
63 Comparing the village map inserted in the Town map (16"=1 mile).	462 fields.	
64 Inserting the village map details in the Town map.	2 villages.	
65 Penciling the village boundary in the Town map.	2 villages.	
66 Inking the village boundary in the town map	3 villages.	
67 Inking the ward boundary in the fair original Town map.	3 wards.	

Serial number and nature of work.	*Daily out-turn.*	*Remarks*
(1)	(2)	(3)
Town Survey—oont.		
68 Inking the fair Town map	1/15 sq. miles	
69 Inserting details of railway lines, rivers, tanks, channels, culverts, burial ground, etc.	1 sheet.	
70 Drawing border lines, scale and inking ..	½ map.	
71 Examining the Town map (completed) ..	½ sheet.	
72 Finalling the fair Town map	½ map.	
73 Touching up the pale lines, names and other typed matters.	½ map.	
74 Verifying the details in the Town map for which colour guides are to be prepared.	1 map.	
75 Preparing combined hand coloured map for verification and return for the municipal commissioner.	1 map.	
76 Preparing colour guides in the 4 different colours in the grey prints.	3 days for 4 colours	
77 Examining the combined colour proof. ..	1 map	

Serial number and nature of work.	*Daily standard of outturn.*
(1)	(2)
II. Finalling The Street Survey Records.	
1 Verifying the scheduled boundary notification and scrutinising composite map with village map.	1 map.
2 Verifying the composite map with the Litho map of villages comprised.	4 side villages.
3 Comparing the cadastral Survey numbers, details, names etc., with litho map.	348 fields
4 Finalling the street survey records, the composite Map, original street survey field measurement book, Tie line book, A and B sketches, traverse sheets, B field book and noting the discrepancies in the error list.	50 fields.
5 Error passing by the Sr.D/man. and H.D.and M.T (4 records) i.e. composite map, tie line book, original street survey field measurement book and A & B sketches.	100 items (25 × 4).
6 Attending corrections as per the error list and preparing slips for typing.	50 corrections.
7 Listing out names to be typed for inserting in the composite map.	150 names.
8 Comparing corrections carried out in the street survey records as per the error list.	100 corrections.
9 Pasting fresh heading, scale, notification particulars, reference for details, imprints, sidenames, etc., in the composite map.	24 items.
10 Finalling the composite map by senior Draftsman.	1 map.
11 Verifying the proof copies with Original composite map.	4 sheets or 1 map.

Serial number and nature of work.	*Daily standard of outturn.*
(1)	(2)
II. Finalling The Street Survey Records—*cont.*	
Preparation of street field tracings.	
12 Tracing the street survey fields in pencil ..	20 fields.
13 Inking the street survey fields	20 fields.
14 Entering measurement in the street survey fields.	8 fields.
15 Preparing enlargement for tie lines	27 stations.
16 Translating common public names and other side names in English.	150 Units (each name to be treated as 1 unit).
17 Writing names of the important details and street survey names.	100 names.
18 Comparing the street field tracings	20 fields.
19 Finalling of street field tracings by Senior Draftsman.	15 fields.
20 Attending corrections pointed out during finalling by Senior Draftsman.	50 corrections.
21 Comparing final correction by Senior Draftsman.	100 corrections.

Sub-process number and description of sub-process.	*Outturn per day.*
(1)	(2)
Revision and reprinting of village maps.	
1 Mending of sheets	8 villages.
2 Marking centre lines for reference of Photo reduction.	12 sheets.
3 Squaring of sheets	11 sheets.

Sub-process number and description of sub-process. (1)	*Out turn per day.* (2)
Revision and reprinting of village maps—cont.	
4 Examining of squares	22 sheets.
5 Attending corrections in the original maps as per the litho maps or T.C. sketches received.	70 corrections.
6 Comparing corrections	140 corrections.
7 Initial scrutiny	1,985 fields or 5 villages.
8 Checking and adopting the correct spelling of side names of villages, leading names, distances with reference to the alphabetical list, taluk maps, etc.	120 names.
9 Pasting the leading names, side village names, etc.	120 names.
10 Covering the distances, names, wells, etc.	200 items.
11 Preparing enlargements for the narrow fields.	60 fields.
12 Preparing enlargements for the village site fields.	9 fields or 41 Hectars.
13 Pasting or drawing and inking scale, area square, north point, etc.	11 villages or 25 items.
14 Sheet joining the original of the village maps.	10 sheets.
15 Inserting imprints	24 villages.
16 Checking the L.B.P. with reference to the litho map [L.B. Prints to be shown to M(T) and orders obtained to credit Number of fields under this item].	457 fields.
17 Inking field boundaries	270 fields.
18 Inking details (The fields where detail is available are to be credited).	110 fields.

sub process number and description of sub-process (1)	*Out turn per day.* (2)
Revision and reprinting of village maps—cont.	
19 Comparing the village map with reference to the litho map.	348 fields.
20 Touching up pale figures, lines, names, etc. (Map to be shown to M (T) and orders obtained for the number of fields to be credited.)	400 fields.
21 Final verification of the original maps to be sent to press for final printing.	400 fields.
22 Attending corrections which are pointed out after final verification of village map.	70 corrections.
23 Checking the corrections listed out during finalling by Senior Draftsman.	10 villages.
24 Verification of final proof as per original map	5 villages or 1,985 fields.

Except item 2 all the other items have been approved in Boards L.Dis. No. NII/8329/66, dated 23rd July 1966.

Serial number and nature of work. (1)	*Out-turn.* (2)	*Remarks.* (3)
PROCESSING AND PRINTING OF VILLAGE MAPS TAKEN OVER UNDER ESTATE INAM ABOLITION ACTS.		
For Helio Processes.		
1 Mending of sheets	8 villages.	..
2 Attending corrections in the litho maps as per the maintenance maps received from the District Revenue Officer.	70 corrections.	..
3 Comparing corrections	140 corrections.	..
4 Adopting correct spelling of side names of village, supply of leading names and distances with reference to the alphabetical list and taluk map, etc.	120 names.	..

Serial number and nature of work. (1)	*Out-turn.* (2)	*Remarks* (3)
PROCESSING AND PRINTING OF VILLAGE MAPS TAKEN OVER UNDER ESTATE INAM ABOLITION ACTS—*cont.*		
For Helio Processes.		
5. i. Verifying the area by traverse and by fields printed.		
ii. Verifying Whether all the side names are printed.	1985 fields or 5 villages	
iii. Verifying the unit war abstract with reference to the Group list received from the unit officers.		
6. Covering angles, distances, unnecessary names wells and details.	200 items.	
7 Attending corrections such as pasting the leading names, side names, etc., pasting heading or unit war abstract or foot note, or order for survey or reference for detail names in the margin.	120 names.	..
8 Verifying S. Nos. particulars, unit boundaries with reference to the unit war particulars.	1,846 fields.	..
9 Attending unit war corrections ..	140 sub-divisions.	
10 Comparing unit war corrections ..	185 sub divisions.	
11 Touching up of pale figures and names		
for 8″ scale map	300 fields.	..
for 16″ scale map	400 fields.	
12 Inserting imprints and touching up the name.	24 villages.	
13 Drawing and inking area sqaure, scale, north point, and key name if any.	11 villages or 25 items.	
14 Finalling of the village maps to be sent for printing.	1,996 acres or 5 villages	
Preparation of original for printing by Vandyke.		
15 Squaring sheets	11 sheets.	..
16 Examining the squaring	22 sheets.	..
17 Tracing from the original with details.	230 fields.	..

Serial number and nature of work. (1)	Out-turn. (2)	Remarks. (3)
Preparation of original for printing by Vandyke—cont.		
18 Checking the sheet joining of the original of the village map in sheet received after enlargement from H section and checking the outlines.	10 sheets.	
19 Checking the tracing as per original	457 fields.	..
20 Inking the field boundary	270 fields.	
21 Inking the details (Fields containing details only to be taken into account).	110 fields.	..
22 Preparation of enlargement fields (including inking and detailing).	9 fields or 41 acres	
23 Preparing enlargements for the narrow fields.	60 fields.	.
24 Comparing the map with reference to the original.	348 fields.	..
25 Checking the names of details, leading names, foot-note, imprints, field number and general verification of the shape of fields, sheet joining, etc. Redrawn and Original fit.	5 villages or 400 fields.	..
26 Attending corrections which are pointed out by the Sr. Draftsman during final verifications.	70 corrections.	
27 Checking the corrections carried out in the original map, as per finalling.	10 villages.	
28 Comparing the final proof and villages (villages less than 500 fields to be credited in terms of villages)	1,995 fields or 5 villages.	..
29 Inserting 13 notification particulars in the original and stock copies.	120 names or 490 units.	..
30 Comparing 13 notifications particulars in the original and stock copies.	240 names or 997 units.	..

(All the items have been approved in Board's L. Dis. No. NII/8322/66, dated 23rd July 1966).

Sub-process number and nature of work. (1)	*Outturn.* (2)
PREPARATION OF TALUK AND DISTRICT TOURING MAPS.	
Preparation of rough original of taluk map.	
1 Inserting the boundaries and other details and V. Nos. entered for each village in original (Projection sheets).	5 pantagraph sketches.
2 Compiling the original by drawing the details in colours including village boundaries, colouring tanks, rivers, road, etc.	2 pantagraph sketches.
3 Examining the original and attending minor corrections.	5 pantagraph sketches.
4 Final examining by Section Head	8 Pantagraph sketches.
5 Inking G Line, border and sheet joining.	1/3rd of the map.
Preparation of fair originals of taluk maps.	
6 Preparing list of names as per alphabetical list of villages, Police stations, etc.	100 names.
7 Comparing (including hamlets) the list of names as per alphabetical list of villages, police station, etc.	200 names.
8 Inking village sites in the fair original L.B. Prints.	2 squares per day.
9 Penciling and inking village boundary ..	2 squares per day.
10 Inking details, i.e., foot path, cart-tracks, Tank etc.	½ square per day or 2 days per square.
11 Inking details, viz. roads, river, electric transmission line and railway line.	6 days per taluk.
12 Inking graticule, border lines and sheet joining.	1 sheet per day.
13 Examining and attending corrections of names, symbols, etc.	2 squares per day.

Sub-process number and nature of work.	*Out-turn.*
(1)	(2)

PREPARATION OF TALUK AND DISTRICT TOURING MAPS.

Preparation of fair originals of taluk map—cont.

14 Final examining by Sub-section Head ..	4 squares per day.
15 Colouring cyano type copies(proof to Collrs.) ..	1 day per copy (4 colours).
16 Examining the colouring in the cyano type copies ..	1 day 2 copies (4 colours).
17 Attending to Collector's corrections	8 corrections per day
18 Examining the Collector's corrections ..	16 corrections per day
19 Final examining by Sub-section Head ..	4 Squares per day.
20 Preparation of colour guides, Red	3 squares per day.
21 Preparation of colour guides, Blue	3 squares per day.
22 Preparation of colour guides, Green	11 squares per day.
23 Preparation of colour guides, Purple	17 squares per day.
24 Comparison of colour guides, Red	5 squares per day.
25 Comparison of colour guide, Blue	5 squares per day.
26 Comparison of colour guides, Green	22 squares per day.
27 Comparison of colour guides, Purple ..	33 squares per day.
28 Tracing hill on oil paper from Sy. of India sheet. ..	2 squares per day.
29 Examining the tracings and attending corrections.	4 squares per day.
30 Inserting the hill contours in the Hill original	2 squares per day (open) 1 square per day (close).

Sub-process No. (1)	*Nature of work.* (2)	*Out-turn.* (3)
	PREPARATION OF TALUK AND DISTRICT TOURING MAPS—*cont.*	
	Preparation of fair original of taluk maps—cont.	
31	Inking the hill contours in the hill original ..	1½ square per day (Open). ¾ square per day. (Close).
32	Examining the hill original and attending corrections.	5 squares per day (open) 6 squares per day (Close).
33.	Final examining	5 squares per day (open) 4 squares per day (close.)
34	Examining the C.C. proof	¼th map.
	Preparation of District Touring Map.	
35	Tracing from the taluk map	1 sheet per day.
36	Inking	½ sheet per day.
37	Examining and attending corrections.	1 sheet per day.
38	Preparing list of names as per alphabetical list, populations as per census hand book, dispensaries and police stations, etc.	100 names per day.
39	Examining the list of names as per alphabetical list, population as per census hand book, dispensaries and police stations etc.,	200 names per day.
40	Inserting in the original	1 Taluk per day.
41	Inking in the original	1/3 square per day.
42	Pasting names, symbols, etc.	40 items
43.	Pasting surrounding names, ref. heading	10 items
44	Inking lines, border lines. sheet joining. ..	4 days per map or ¼th map per day

Sub-Process number and nature of work.	*Outturn.*
(1)	(2)
45 Examining the fair original and attending corrections.	1 sq. per day.
46 Final examining by sub-section head ..	2 sq. per day.
47 Colouring the cyano type copies ..	2 days per copy of 5 colours.
48 Examining the coloured cyono type copies.	1 day per copy of 5 colours.
49 Attending Collector's, corrections	8 Corrections per day.
50 Comparing Collector's corrections	16 Corrections per day.
51 Preparation of colour guides Red	2 squares per day.
52 Preparation of colour guides Blue	2 squares per day.
53 Preparation of colour guides Green	2 squares per day.
54 Preparation of colour guides Purple	1 day per map.
55 Preparation of colour guides Crimson ..	2 days per map.
56 Examining colour guides Red	5 sq. per day.
57 Examining colour guides Blue	Do.
58 Examining colour guides Green	1 day per map.
59 Examining colour guides Purple	1 day per map.
60 Examining colour guides Crimson	½ day per map.
61 Examining the C.C. proof copies	1/6th map per day or 6 days per map.

Sub-Process number and nature of work. (1)	*Outturn.* (2)
Preparation of Pentagraph Sketches.	
62 Pentagraphing V. Maps (Single Reduction) ..	5,000 Acres per day
63 Pentagraphing V. Map (Double)	2,500 Acres per day.
64 Inking pentagraph sketches	2,500 Acres per day.
65 Examining pentagraph sketches	5,000 Acres per day.
66 Finalling pentagraph sketches	7,500 acres per day.
Preparation of Eye Sketch Map of the taluk.	
67 Tracing in pencil	1 taluk per day.
68 Inking	1 taluk per day.
69 Writing side names, heading, marking border lines, etc.	1 taluk per day.
70 Writing names of villages including village number, name of forest and town, etc.	162 names.
Inserting the details as per maintenance corrections in the original Map as per Pentagraph Sketch.	
71 Inserting details, etc., in the original map as per pentagraph sketch of maintenance corrections.	14 Villages.
72 Inking do.	9 Villages.
Inserting village boundaries and details in the original maps as per Pentagraph Sketches.	
73A Setting up and inserting the village boundaries or details in the fair original as per pentagraph sketches prepared on scale $1\frac{1}{2}''=$ 1 mile from the village maps.	6 pentagraph sketches.
73B comparison of the above items of work ..	13 pentagraph sketches.

Sub-Process number and nature of work.	*Standard outturn.*	*Remarks.*
(1)	(2)	(3)
1 Preparing locality war register with reference to the registers, taluk maps, group lists, eye sketches and particulars received from the District Unit Offices.	200 lines.	
2 Comparing the locality war register with reference to the area registers, taluk maps, group list, eye sketches and particulars received from the District Unit Offices.	401 lines ..	
3 Attending to the corrections in the stock copies of village maps.	80 corrections.	
4 Comparing the corrections in the stock copies of village maps.	161 corrections.	
5 Pasting reference on village maps due to corrections.	200 units.	
6 Comparing the reference of village maps due to corrections.	401 units.	
7 Preparation of side tracings for supply to the Assistant Directors of survey and Land Records of District Unit Offices.	11 sheets.	
8 Comparing the side tracings for supply to the Assistant Directors of survey and Land Records of District Unit Offices.	22 sheets.	
9 Correction relating to field or village boundary.	46 corrections.	
10 Correction relating to details continuation.	65 corrections.	
11 Correction relating to names, S. Nos., etc.,	117 corrections.	

Sub-Process number and nature of work.	*Standard outturn.*	*Remarks.*
(1)	(2)	(3)
12 Comparing corrections relating to field or village boundaries.	92 corrections.	
13 Comparing details, boundaries continuations.	129 corrections.	
14 Comparing names ,S. No. etc., ..	222 corrections.	
15 Preparing Extracts	13 fields.	
16 Comparing Extracts	33 fields.	

STATEMENT SHOWING SUB-PROCESSES AND OUTTURN FOR THE PREPARATION AND SUPPLY OF EXTRACT TO THE PRIVATE PARTIES.

Serial number and nature of work.	*Outturn.*	*Remarks.*
(1)	(2)	(3)
Preparing F.M. Book Extracts.		
1 Fields	12 fields ..	Statement showing the outturn as approved in Board's L. DIS No. NII·8329/66 dated 23rd July 1966.
2 Sub-divisions	80 sub-divisions	
3 Offsets in case of M.C. fields ..	160 offsets.	

Sub-Process number and nature of work. (1)	*Standard outturn.* (2)	*Remarks.* (3)
Comparing F.M. Book Extracts.		
4 Fields	30 fields.	
5 Sub-divisions	160 sub-divisions.	
6 Offsets in case of M.C. fields ..	320 offsets.	
Preparing Extracts of Town Survey R.B. Map.		
7 Tracing Inking and figuring ..	8 Fields.	
8 Comparing the extracts prepared from the R.B. Map.	17 fields.	
Preparing Extracts from M.L. Maps		
9 Tracing from the M. L. Map ..	185 fields.	
10 Inking the tracing from the M.L. Map.	185 fields.	
11 Detailing the tracing from the M.L.Map.	115 fields.	
12 Comparing the tracing prepared from the M.L. Map.	230 fields.	
Preparing Amin F.M. Book Extracts.		
13 Preparing extracts from the Amin F.M. Book Thakwar measurements in copy stamp paper.	300 words with Heading.	
14 Comparing the extracts from the Amin F.M. Book.	600 words.	
15 Preparing extracts of Rough sketches from the A.F.M. Book.	30 fields.	
16 Comparing extracts Rough sketches from the A.F.M. Book.	60 fields.	

STATEMENT SHOWING THE LIST OF SUB-PROCESS AND OUTTURN FOR THE PREPARATION AND SUPPLY OF SKETCHES TO HIGHWAYS DEPARTMENT APPROVED IN BOARD'S L.DIS. NO. NII. 8329/66, DATED 23RD JULY 1966.

Sub-process number and nature of work.	*Standard outturn.*	*Remarks.*
(1)	(2)	(3)
1 Mending village maps	8 villages.	
2 Verification of the course of the road with village maps, taluk maps and F.M. Books.	10 Villages.	Approved in D.D.S. and L. Rs., K. Dis. 21377/70, dated 6th November 1970 *Vide* C.S.O. file *D. Dis.* 34922/70, dated 24th December 1970.
3 *a*. Preparation of fields	15 fields.	
b. Preparation of sub-divisions ..	129 sub-divisions.	
c. Preparation of offsets for M.C. fields.	172 offsets.	
d. Preparation of stations for M.C. fields.	86 stations.	
4 *a*. Comparison of fields	30 fields.	
b. Comparison of sub-division ..	258 sub-divisions.	
c. Comparison of offset for M.C. Fields.	342 sub-division.	
d. Comparison of stations for M.C. Fields.	172 stations.	
5 Preparation of key maps	**3 key maps in 2 days.**	

Sub-Process number and nature of work.	*Standard outturn.*	*Remarks.*
(1)	(2)	(3)
6 Comparison of Key maps ..	3 maps	
7 Sorting and arranging the road sketches in accordance with the course of the Road.	350 fields.	
8 Finalling fields in detail ..	28 fields.	
9 General Comparison of fields ..	277 fields.	

Note.—During preparation of field measurement book sketches if a field more than one field measurement book size is available separate orders will be obtained either from Manager (Technical) or Head Draftsman as the case may be for passing the diary of the individuals (*vide* F5 25546/66).

STATEMENT SHOWING THE OUTTURN FOR THE TYPOGRAPHERS AS APPROVED IN BOARD'S L.DIS. NO. NII·8329/66, DATED 23RD JULY 1966.

Serial number and nature of work.	*Standard outturn.*	*Remarks.*
(1)	(2)	(3)
1 Composing distributing and supply of printed slips.	100 names or words.	
2 Typing with tripod typing machine composing and distributing after the work is over by one typographer.	50 names or Impressions.	

Serial number and nature of work.	*Standard outturn.*	*Remarks.*
(1)	(2)	(3)
3 Typing with tripod typing machine composing distributing after the work is over by one typographer.	80 names or Impressions.	
4 When the same matter composed is typed in the copies of the maps as in the case of Imprints.	100 names or Impressions.	
5 Typing contour heights and symbol in the taluk map.	200 Nos.	
6 Attending to correction of names when typed matters are actually erased cleaned, and fresh names are typed.	25 Impressions.	
7 Distributing of the standing matters, cleaning of the cases, Distributing the types in the case after fresh supply.	Miscellaneous.	
8 Typing survey field Nos. in the map.	300 Nos.	

APPENDIX No. XVII.

THEODOLITE SURVEYS.

Rules for reading and recording angles by repetition.

1. *Method of observation at boundary and Khandam stations and the preparation of field book.*—Having carefully levelled and centered the theodolite over the station, the back station is intersected, using either tangent screw after both plates have been clamped, particular care being taken to clamp the lower plate firmly ; the horizontal reading is then taken and entered in the field book. This will be the zero of observation. The upper plate is then released and the forward station intersected by using the upper tangent screw and the horizontal reading is again taken and recorded above the first. Keeping the upper plate clamped, the lower plate is released and the instrument turned again to the back station, intersecting it by the lower tangent screw. The reading of the arc should obviously not be altered by so doing: nevertheless the arc should be read again to see that no change has taken place. The upper plate is next released, the forward station intersected as before with upper tangent screw and the third horizontal reading is recorded above the second. Then by subtracting the first from the second reading (increasing the latter by 360 if necessary) one measure of the forward angle is obtained and similarly subtracting the second from the third another measure of the same angle is got from a different portion of the arc. These angles are taken out immediately after recording the third reading and entered on the right hand side of the field book ; if they do not agree within the minimum graduation of the theodolite a third measure of the angle should be taken and recorded in a similar way.

2. *Caution to the surveyor.*—The back station must be intersected first, otherwise the supplement of the angle will be measured and this being not noted in the field book and consequently unknown to the Computor, the traverse will not prove. This mistake is not likely to occur if surveyors are made to understand why the back station should be intersected first. If the above method be strictly carried out it is quite impossible for any egregious error to creep into angular measurements, unless by gross negligence on the part of the surveyor.

3. *Observation at trijunctions.*—All the three angles at a trijunction should be observed from at least two different Zero stations beginning and ending each swing with the Zero station. Thus, if A be the station at which observations are to be taken to B, C and

D, Station B is intersected with either tangent screw, the horizontal reading is taken out and recorded in the field book. The upper plate is then released, the lower being kept clamped and the station C intersected by using the upper tangent screw: the horizontal reading is again taken and recorded above the first. Stations D and B are similarly intersected and angles are recorded thus completing one swing. The process is repeated with the same zero but with C as the Zero station. There must be two measures for each angle as a single measure is not free from error.

4. *Centering and intersection.*—An error of one inch in the centering of the theodolite or the intersection of the flagstaff will produce an error of nearly 1½ metres (5 feet) a distance of 20 metres (one chain) and the angular error increases as the distance diminishes. Consequently the smaller the distance between stations, the greater is the necessity for care both in centering the instrument and intersecting the arrow or flagstaff which should be held vertically over the station mark. The verticality of the arrow or staff should be tested by bringing the vertical cross-wire of the telescope on the staff and swinging the telescope about the transit axis and watching that the flagstaff, coincides with, and remains on the vertical cross-wire throughout its swing. If not the flagman should be signalled to move the staff in the appropriate direction and this done, the cross-wire must be set to intersect the lowest visible portion of the staff.

APPENDIX No. XVIII.

COST OF WORK.

The expenditure incurred each month by the District Survey Unit should be grouped under the following main heads :—

1. Work charges.
2. Boundary pillars and hired labour.
3. Supervision, and
4. Miscellaneous.

1. WORK CHARGES.

The total expenditure incurred by way of pay of men who are constantly engaged on a particular job, i.e., pay of field and deputy surveyors in field and Computor-Draftsmen in office, should be taken as the work charges for the locality. This should be obtained from the outturn statement received from field for each locality and from monthly abstracts prepared in office for Computor-Draftsman. Actual expenditure incurred for each locality should thus be arrived at.

2. BOUNDARY PILLARS AND HIRED LABOUR.

Boundary pillars are paid for on contractor s bills or by book adjustment if the stones are taken from Revenue Stone depots. Hired labour in the shape of a measurement allowance and pay of measurers is passed on outturn statements. The actual expenditure on this item should be ascertained for each locality.

3. SUPERVISION.

The charges under this head comprise the expenditure on account of the pay and travelling allowance of the Deputy|Assistant Director, of Clerks, of Head Draughtsman and of peons in the Unit. The charges towards supervision should be made at 50 per cent of the work charges for that locality.

4. Miscellaneous.

All remaining expenditure, such as (*a*) Pay and travelling allowance of Inspector of Survey and Land Records and his peons engaged on the work, (b) Travelling allowance of the Staff, (*c*) Contingencies, (*d*) Leave salaries and (*e*) Cost of instruments and cost of stationery and forms, come under this head—

(*a*) *Pay and travelling allowance of Inspector of Survey and Land Records and his peons engaged on the work.*—The actual expenditure on account of the Pay and travelling allowance of Inspector of Survey and Land Records and his peons should be ascertained from the diary and tour journal of the Inspector of Survey and Land Records and charged.

(*b*) *Travelling allowance of the staff.*—The travelling allowance incurred on account of work in a particular locality should be taken from the travelling allowance bills of the subordinates. The forward journey of a man to commence his work should be charged to that locality and the return journey to the locality to which he is transferred.

(*c*) *Contingencies.*—The charges under this head include all items of contingent expenditure, such as rents, service postage, office expenses and cleaning charges and other contingencies. The charges towards 'Contingencies' should be made at 10 per cent of the work charges for that locality.

(*d*) *Leave salaries.*—This should be charged to Government entirely.

(*e*) *Cost of instruments and cost of stationery and forms.*—This should be charged at the rates prescribed for each item.

The cost of printing of maps chargeable to a particular locality should be ascertained from the Central Survey Office, Madras.

Charges on account of leave and pensionary contributions should be worked out according to the instructions under Fundamental Rule.

APPENDIX No. XIX.

INSTRUCTIONS FOR THE PREPARATION OF ORIGINAL DRAWING FOR REPRODUCTION BY THE VANDYKE PROCESS.

1. The process being adopted only to the reproduction of drawings of the same scale, they should, if possible, be drawn on a single sheet. The size of the rectangle containing the drawings should not exceed 800 m.m. x 600 m.m. Drawings exceeding these dimensions should be drawn in two or more sections and they will be printed in sections of the same size.

2. Blue tracing cloth, tracing paper or bank post paper is the most suitable form of " original ", failing this, any smooth surfaced paper may be used of any ordinary thickness. Rough surfaced drawing paper, yellow tracing paper or yellow tracing cloth is quite unsuitable and should not be used.

3. It is essential that the work should be perfectly drawn in good black ink. " Perfectly drawn " means that all parts of the drawing must be absolutely black and equally opaque. A good test is to hold the tracing up against a very strong light and carefully examine for any sign of greyness or transparency in the lines. If found grey or broken, it should be returned to the draftsman for re-inking. More care should be taken in drawing on paper, as owing to its greater capacity, the lines will look blacker than they really are.

4. The drawing as a whole should be neat, firm and black.

5. A good quality of Indian ink freshly made up should be used. When drawing on tracing cloth, a slight addition of oxgall will make the ink " take " better. Heavy block letters or border lines may be gone over twice using " photopake " the second time. The use of colours in the drawing is in-admissible.

6. Nothing whatever should be written on the back of the original nor should anything be pasted on either the front or the back of it. Any matter pasted on the drawing will not reproduce and consequently the missing data will have to be drawn on the zinc plates afterwards. The original should be clean both face and back. Erasing should be avoided.

7 Headings, footnotes, or other typed matter should be neatly printed or preferably written by hand in their proper places.

8. Originals should not be folded but either kept flat or rolled up. Wrinkles or creases should be avoided.

9. In the case of drawings requiring to be reproduced in colours, two originals are essential a fair one, all in black excluding colour washes, binders, etc. and a rough combined coloured sketch showing the various details required in different colours the same as the final copies should contain, to serve as the colour guide.

10. These instructions are, in the main, applicable also to drawings for Helio-Zincography.

APPENDIX NO. XX.

TO PREVENT INJURY TO RECORDS DURING TRANSIT, THE FOLLOWING INSTRUCTIONS SHOULD BE ATTENDED TO IN PACKING THEM FOR DESPATCH.

Number and nature of record. (1)	*Instructions for packing.* (2)
1 Original Village Maps	Rolled and enclosed in tin cases (Tinchongas) and protected inside and outside. If the number of maps is large they should be laid flat in deal wood cases.
2 Block Map	Packed in double mats and water proofed with wax cloth.
3 Lithographed Village Maps	
Sketches.	
4 Boundary demarcation sketches	Packed in double mats and water proofed with wax cloth or between Boards.
5 Field demarcation sketches	
6 Khandam Sketches	
G. Sketches	
Purtal sketches	
Triangulation sketches	

APPENDIX No. XX—*cont*

Other Records.

Number and nature of record. (1)	*Instructions for packing.* (2)
10 Traverse field books	Packed in bundles and water proofed with wax cloth.
11 Traverse sheets	Packed between boards.
12 Field Measurement books	Packed in bundles and water proofed with wax cloth.
13 Field Registers	
14 Inspection Report	
15 Encroachment lists and sketches	
16 Rough area lists	
17 Fair Area lists.	
18 Field Final Examination Reports	Packed between boards.
19 Office (Examination Reports)	
20 Amin's Field Books	Packed in bundles and water proofed with wax cloth.

Insurance should be effected at the scale shown below when the following records are sent by rail.

Records. (1)	Rate of *Insurance* (or) *Per sq mile.* (2)	*Per Sq. Kilo metre* (3)
	RS.	RS.
1 Traverse field books	85	35
2 Traverse Sheet	85	35
3 Field Measurement Books	75	30
4 Village Maps (Manuscript)	85	35

NOTE:—(1) Records should be sent by insured Railway Parcel when the value exceeds Rs. 500/- when they cannot be sent through a special messenger.

(2) When the actual value of the records sent works out to more than the rates specified above, the calculation of the value should be made at the actual rate.

(3) The following instructions should be borne in mind whenever the records or costly survey instruments are sent by insured Railway Parcel regarding the packing.

(4) The packing should be done in such a manner that they are not likely to be damaged if fairly handled and packed are sealed in such a manner that any tampering could be easily detected.

APPENDIX No. XXI.

TAMIL NADU SURVEY DEPARTMENTAL TESTS.

1. Examinations for qualifications in the grades of Field and Deputy Surveyors, Head Surveyors and Inspector of Survey and Land Records, Computor Draftsmen will be held twice a year, in May and November on dates and at places which may from time to time be notified by the Tamil Nadu Public Service Commission.

2. The Field Surveyor's test and the Deputy Surveyor's test will be held in English or in the Language selected by the Candidate. Field Surveyors of not less than six months service in the Department can sit for the Field Surveyor's test. Field and Deputy Surveyors who have passed the Field Surveyor's Test and Probationery Deputy Surveyors who have put in a service of not less than six months are eligible to sit for the Deputy Surveyor's Test.

3. The examination for the post of Head Surveyors will be called the Head Surveyor's and Inspector's Test and will be held in English. It will be open only to the Subordinates in the Survey and Land Records Department. A certificate that the candidate is capable of answering the paper in Good English, will have to be issued by the Head of the Office in the case of candidates who do not possess the Minimum General Educational Qualification (*vide* Orders in G.O. Ms. No. 1595, Revenue, dated 25th June 1951 and Board'sReference No. N.1611-51-3, dated 21st April 1951.)

4. The examinations for the Computor Draftsman will be called the Revenue Draftsman's Test and Computation Test. Both the tests will be open to all Computor Draftsman in Survey and Land Records Department.

5. All the tests mentioned above will also be open to persons who may have been discharged from the Tamil Nadu Survey and Land Records Subordinate Service for want of vacancies if they are otherwise qualified to appear for them.

6. No fees will be levied from the candidates for two examinations by the same test. A fee of Rs, 5 will thereafter be levied every time the candidate appears for the test, except in the case of the Head Surveyor's and Inspector's test for which the fee leviable will be Rs. 10.

AMENDMENT.

In the rules contained in Appendix XXI to the Tamil Nadu Survey Manual, Volume II after paragraph 6 and a new paragraph as follows:—

" 6-A.—

(i) The Head Surveyor's and Sub-Assistant's Test. The Deputy Surveyor's test the field surveyor's test and the computation test will comprise two papers each, while the Revenue Draftsman test will comprise four papers.

(ii) The duration of all the papers relating to departmental tests shall be 3 hours each.

(iii) A maximum of 100 marks shall be presribed for each paper and minimum marks to be secured for a pass shall be 50 per cent in each paper.

(iv) The candidates for the Revenue Draftsman test will be allowed to pass each paper separately instead of all the four papers in one sitting."

(True copy)

(Copy of G.O. Ms. No. 457, C.T. and R.E. Department, dated 29th April 1982.)

File No. C4.31508|82.

For Deputy Director of Survey.

7. The following are the subjects for the examinations :—

I. Field Surveyor's Test.

(1) *Arithmetic.*—Up to vulgar fractions and square root.

(2) *Hand writing and dictation.*—Candidates possessing the Minimum General Educational Qualification need not appear for this.

Candidates who did not possess the minimum General Educational Qualification and absorbed in the Survey and Land Records Department with reference to G.O. Ms. No. 421, Revenue, dated 27th February 1967 are exempted from passing the paper on this subject.

(G.O. Ms. No. 5, Revenue, dated 2nd January 1973.)

(3) The whole of the book entitled "Chain Survey and Land Records Manual—Part I".

(4) Survey Manual, Chapters I, II, VI, VII, XV and XVI whole.

Chapter X, Rules 6 to 14.

Chapter XI, Rules 1 to 7.

Chapter XII, Rules 1 to 25.

Chapter XIX, Rules 1 to 7 and Rules 39 to 68.

Chapter XX, Rules 235 to 272.

Chapter XXIV—Chain, Cross Staff, Offset pole, Plotting Compasses, Drawing Pen, Parallel Rule, Scales and area square paper.

Chapter XXV—Problems exclusive of those which require the use of theodolite or circumferenter.

(5) Chain Survey and Land Records Manual—Part II, except appendices III, IV, V, VI, VII, X, XI, XII, XV and XVI, Manual of Village Accounts.

(G.O. Ms. No. 3909, Revenue, dated 15th October 1958)

II. Deputy Surveyor's Test.

(1) *Arithmetic.*—Up to decimal fractions and square root.

(2) *Hand writing and dictation.*—Candidates possessing the Minimum General Educational Qualification need not appear for this.

Candidates who did not possess the minimum general educational qualification and absorbed in the Survey and Land Records Department with reference to G.O. Ms. No. 421, Revenue, dated 27th February 1967 are exempted from passing the paper on this subject.

(G.O. Ms. No. 5, Revenue, dated 2nd January 1973)

(3) The whole of the book entitled "Chain Survey and Land Records Manual—Part 1".

(4) Survey Manual, Chapters I, II, VI, VII, XV and XVI whole,

Chapter X, Rules 3 to 13.

Chapter XI, Rules 1 to 6.

Chapter XII, Rules 1 to 30.

Chapter XIII, Rules 1 to 131.

Chapter XIX, Rules 17 to 38.

Chapter XX, Rules 235 to 272.

Chapter XXIV all Survey instruments except proportional compass, beam compass, bow compass and pantagraph.

Chapter XXV Problems.

Manual of village accounts.

Manual of Taluk Accounts—Taluk Manual, Register Nos. 4, 5, 6, 7 and 8A.

(5) Chain survey and Land Record's Manual, Part II—except appendices III, IV, V, VI, VII, X, XI, XII, XV and XVI.

(G.O. Ms. No. 3909, Revenue, dated 15th October 1958)

III. Head Surveyor's and Inspector's Test—Written Test.

1. Arithmetic.

2. Mensuration.

3. Trigonometry—Solution of plane triangles.

4. Survey Manual—whole book except (i) Paragraphs 40 to 234 of Chapter XX and (ii) the whole of Chapter XXIII.

5. Boileau's Traverse Tables. Explanation and use of the tables.

6. Chain Survey and Land Records Manual, Part II—Except Appendix IV.

7. Village Manual of Accounts and Taluk Manual of Accounts.

Practical Test.—Those who have passed in the written examination will undergo a practical examination conducted at the instance of the Tamil Nadu Public Service Commission by the Assistant Director, in charge of a survey Unit who will report the result thereof to the Commission. The Deputy or Assistant Director of Survey and Land Records, as the case may be shall be instructed to conduct the practical test on a particular date to be fixed by the Joint Director of Survey and Land Records within a month from the date of publication of the result of the written Test. The practical test should be completed in the entire State within a stipulated time. The candidates will have to appear for the written test again, if they fail in three attempts in the Practical Test.

(G.O. Ms. No.1548, Revenue, dated 22nd May 1970)

IV. Revenue Draftsman's Test.

1. Construction of scales—Simple and diagonal.

2. Traverse and protractor plotting.

3. Plotting fields on scale 1 m.m. : 1,000 m.m. (1 inch = 2 chain) and 1 m.m. : 2,000 m.m. (1 inch = 5 chains)

4. Plotting village map on Scale 1m.m. : 5000 m.m. (16″ = 1 mile)

5. Testing plotting of village maps on 1 m.m. : 5,000 m.m. (16 inch = 1 mile) scale.

6. Inking field boundaries for reproduction to scale and reduction to smaller scales.

7. Typing field numbers.

8. Area computation with computing scale.

9. Printing names and inserting topographical details in village maps.

10. Comparison of field and village boundaries and side measurements.

11. Colouring by washes and binders.

12. Tracing and inking taluk and district maps.

8. The Tamil Nadu Public Service Commission will arrange for the setting and the valuation of examination papers by the Officers of the Tamil Nadu Survey and Land Records Department or by such other officers as the Commission may deem suitable for the purpose.

9. Candidates who obtain not less than 50 per cent of the total number of marks prescribed for each test will be considered to have passed. Candidates for the Head Surveyor's and Inspector's Test must also pass by the practical test.

10. The names of successful candidates will be notified in the Tamil Nadu Government Gazette.

V. Computation test.

PART I.

Mathematics (General).

1. *Arithmetic*—

(*a*) Simple and compound proportion, profit and loss and interest.

(*b*) Square and cubic measure.

(c) Square and cubic roots.

(*d*) Decimals.

2. *Geometry*—

(*a*) Properties of triangles, quadrilaterals and Polygons.

(*b*) Circle, radius, diameters, chord and tangent and their relation to each other.

3. *Trigonometry*—

(*a*) Sine, cosine, tangent, their reciprocals and their relation to each other.

(*b*) Solution of triangles—right angled and oblique angled.

(*c*) Area of triangles.

(*d*) Simple question on logarithms and numbers and trigonometrical functions and capital logarithms.

(*e*) Heights and distances.

4. *Mensuration*—

(*a*) Area of geometrical figure-triangles, quadrilaterals and polygons.

(*b*) Surface of a cube, sphere, cone and a pyramid.

PART II.

Computation (Technical).

1. Traverse Survey.—

2. Traverse computation of—

(*a*) Main circuits with reference to a taluk or district origin.

(*b*) Village and Khandam circuits.

(*c*) Location of errors and preparation of correction field book.

3. Traverse plotting.

4. Construction of scales, simple diagonal and vernier.

5. Computation of azimuths rectangular and spherical co-ordinates, convergency of meridian and hypotenuse distance.

6. Computation of latitudes.

7. Reharmonising and computing of values of village Trijunctions, graticule projections, projection of points with rectangular and spherical values and method of reducing values of points from one origin to the other.

APPENDIX No. XXII.

INSTRUCTIONS REGARDING THE SUBMISSION AND RECEIPT OF PETITIONS ADDRESSED TO THE BOARD OF REVENUE.

1. Any person having cause of complaint against any servant of Government subordinate to the Board shall seek redress in the first instance from the local authority who, if unable to grant the redress sought, shall pass an order in writing to that effect. If dissatisfied with this decision, the petitioner may address the next higher authority or if there is no such authority, the Board.

2. The Board will not receive a petition on any matter unless it shall appear that the petitioner has first applied for redress to the local authorities including the Joint Director of Survey and Land Records and the Director of Settlements, Madras. The petitions addressed to such authorities and any replies given or orders passed by those authorities or copies of them must be annexed to the petition addressed to the Board.

3. All heads of offices will understand that a person affected by an order is entitled, if he applies for it, to be furnished free with a copy or extract of such order on plain paper, which except in cases in which no appeal lies, should contain a statement of the grounds for the decision.

4. Petitions addressed to the Board should be written on durable paper of the size of a foolscap sheet or half sheet, an ample margin being allowed.

5. (1) Petitions addressed to the Board may be submitted either by the principals themselves or by their vakils or duly authorized agents.

(2) Petitions signed by vakils or agents on behalf of their principals must be accompanied by a duly stamped vakalathnama or by a general or special power-of-attorney.

Note.—In case a general power-of-attorney is filed with a petition, it will be duly returned by the Board, after the disposal of the petition to the party producing it.

(3) Anonymous petitions will be totally disregarded.

6. Resolutions submitted by associations and other similar bodies will receive no attention; any such body wishing action to be taken on its representations should submit them in the form of petition stating the grounds and circumstances of each case.

7. (1) Every officer wishing to petition the Board should do so separately.

(2) No officer may submit a petition in respect of any matter in which he has no personal interest:

Provided that nothing in this instruction shall apply to representations submitted by recognized associations of Government servants in accordance with such rules as may from time to time be prescribed by the Government.

8. (1) Every petition by an officer must be submitted through the head of the office or department to which the petitioner belongs or last belonged if he is no longer in service.

(2) In cases governed by clause (1) supra, there is no objection to the petitioner's transmitting a duplicate copy of his petition direct to the Board, provided he marks it as 'Duplicate'.

(3) Petitions sent direct to the Board in contravention of clause (1) will be returned to the petitioners who should resubmit them through the Joint Director of Survey and Land Records or local authority concerned, within one month from the date of such return. If further delay is permitted to take place in the resubmission of a petition so returned, it will be liable to summary rejection as time-barred unless received within the period of limitation allowed by rule 10 infra.

9. The head of the office through which an officer's petition is submitted shall forward it to the Board at once through the ordinary official channel. Unless it is barred by limitation, is not duly stamped, is liable to summary rejection, or is inadmissible under any legal enactment or executive order, the head of the office shall submit with the petition all connected records. In these excepted cases, he shall cite specifically the paragraph and clause of the rules containing the exception under which he considers the case falls, giving reasons for his view. It is left to his discretion to discuss the accuracy or validity of the statements made, inferences drawn or arguments put forward in the petition.

10. Appeals to the Board against departmental orders of dismissal, removal, reduction, suspension, withholding of promotion, fine or censure passed on Government servants should be filed within two months after the date on which the officer preferring the appeal was informed of the orders against which he appeals.

11. Petitions addressed to the Board will be liable to summary rejection in the following cases :—

(1) when a petition is illegible or unintelligible ;

(2) when a petition contains language which, in the opinion of the Board is disrespectful, improper or otherwise objectionable ;

(3) when a previous petition has been disposed of by the Board, the Government of Tamil Nadu or other superior authority and the petition discloses no new facts or circumstances which afford ground for a reconsideration of the case ;

(4) when a petition is an application for pecuniary assistance by a person manifestly possessing no claim thereto :

(5) When an appeal is preferred against the discretionary exercise by local officers of the right of distributing subordinate appointments which are in their gift ;

(6) When a petition is an appeal in a case for which the law provides a different or specific remedy or in regard to which the time limited by law for appeal has been exceeded.

12. (1) In every case in which an appeal is withheld the appellant shall be informed of the fact and the reasons for it.

(2) When an appeal is withheld on account only of failure to comply with the above provisions may be resubmitted any time within one month of the date on which the appellant has been informed of the withholding of the appeal, and, if resubmitted in a form which complies with those provisions, shall not be withheld.

13. Petitions presented to the Board by persons not possessing a personal interest in the sub-matter of the complaint will generally remain unnoticed; but even in those cases in which the Board may consider it expedient to forward such petitions to local officers, the petitioners will receive no reply from the Board to their communications.

APPENDIX XXIII.

NOTES ON HAND TYPING.

1. *Pasting.*—There should be no pasting of any kind on any fair sheet original except with the specific sanction of the Deputy Director, Map Drawing Office, who will accord such sanction only for very exceptional cases after discussing the same with the works manager.

2. *Good type essential.*—In order to ensure that wornout type is not used on any of the fair sheet originals, a constant watch must be kept by examining the trial impression usually taken before typing on the fair sheets and the worn out types should not be replaced in their type cases, but should be kept separately in a wooden box allotted for the worn-out types. These worn-out types may be sent to the Type-foundry for recasting.

3. *Supply of new types.*—Indents for sufficient quantity of each type fount should be made one year ahead, so as to maintain a year's requirements always at hand on stock.

4. *Typing machines.*—The typing machine consists of a small tripod stand with a socket in which a tube, with the type-holder connected works. These machines are called tripod machines. Impressions are produced by a direct stroke and not by pressure.

5. *Method of using.*—A typer's first care on receiving a machine should be to see that it is properly adjusted to suit his style of holding and stroke. He should then clear the holder of every speek of dust and neatly fill it with letters from the same fount, hold the machine firmly at the back with the left hand and strike the centre of the disc above sharply with his right hand. The blow should be delivered with the outside of the little finger of the right hand and not with the palm, the movement being from the wrist. To have a machine adjusted for his own use, get familiar with and keep it, is, to a typer, a valuable aid to produce good work. Then the holder shows any lateral motion slurred impression will be the result.

6. *Typing ink.*—Trade 'Type ink' lacks density but good result can be obtained from a mixture of fine black proofing ink (litho) and chalk black litho ink. The proportion of the mixture varies with climatic conditions and can be determined by experiment. Equal quantities of each will meet normal requirements.

7. *Reducing and testing ink.*—Turpentine should never be used a reducer. To test the quality of the mixture, a small quantity should be well rolled or spread on glass slab with a roller or a dabber. If this slab be held up against the light, the ink, if the mixture is correct, will present an even opaque layer, free from lumps or brown patches. Another test is to type a few impressions on drawing paper and lightly pass the tip of the finger over them. If the ink is right it will not spread easily and any spreading, there may be will not also be brown.

8. *Slabs.*—Glass slabs for ink are best. These like all other inking materials, should be kept free from dust. Gritty ink never produces good results. Once at least in the mid-day a Typer should scrap the ink from the slab and replace it by fresh ink. When the ink is spread on the slab and the slab held against transmitted light, the ink should appear on even shade through out and not patchy. Keeping the slab on a small stool right away from the fair map not only safeguards the work but there is much less chance of the ink being smothered with fine particles of paper.

9. *Dabbers.*—For good clean sharp typing soft dabber are best.

10. *Cleaning.*—Dabbers, slabs and knives should be cleaned every evening. Slabs and knives with a little turpentine, dabbers by rubbing lightly on a clean slab or paper to remove the ink and then washing with cold water only. The dabber should not be dried but should be placed upside down in a box, with a lid and by next morning they will be found to be ready for use.

11. *Tables.*—A better chance of producing good work is when working on a smooth hard material such as glass or Zinc with a single thickness of blotting paper between the fair original and the glass or zinc plate.

The zinc plate should always be kept covered with a smooth piece of thin paper to prevent the back of a fair map getting soiled.

12. *Composing.*—The type-holder should first of all be cleaned of every speck of dust, with a pin or other sharp pointed instrument. The machine is held with the stand upper most and the type holder showing in the left hand. The composing is done on the side away from the screw, all letters being placed with the nicks inside. The name is set in the centre of the holder by placing spaces to the right and left. In choosing spaces, those that have been used often as the "Screw space" should be rejected as they never rest flat in the machine and also cause a bad set to a name

with a probability of blurred impression. Not even the slightest space should be seen between the base of the letters and the holder. If any letter be higher than the rest, they should be pressed with a pencil as ink does not take readily after the hand has been on the type. Hence, pressing down with fingers should be avoided. The letters in the case should be occasionally be stirred upto ensure the whole fount being used in rotation.

13. *Preparation of ink.*—Ink for typing should be prepared by adding very small quantities to obtain the amount required. If too much ink is smeared on the slab and reducing it is tried, it will be far from good and will always lead to bad results.

Grey typing is bad but type which has been too heavily loaded with ink gives worst results as the ink smears. An excess of ink should therefore, be rigorously avoided.

14. *Method of work.*—The names which are in small types should be typed first and afterwards the longer lettering. Large types require more ink and the procedure mentioned will make the ink dry every night with possibilities of smearing reduced to the very minimum.

15. *Inking the types properly.*—The typer should hold the machine in his left hand with the stand nearest to his body, the disc at the head of the spring resting in his third finger and then press upon the stand with his thumb pushing the legs quite clear on the dabber avoiding any possibility of their being covered with ink. The types should be pressed very lightly with the dabber as it is only the face of the type which requires inking.

Forcing the dabber into the type or using scraping motion gives a patchy impression instead of sharp lettering.

16. *Books for types.*—A small book should be kept near at the hand to receive the first trial impression to enable the typer to check each name for correct spelling and good condition of type. This will also provide a good record of the daily outturn.

17. *Care of tripod machines.*—Special care should be taken to see that the machine is properly levelled. For this purpose trial impressions should be taken. Otherwise, one end of name will get a heavier impression than the other. Only a piece of thin rough paper may be used under the feet of the machine to give a good grip and prevent any soiling of the fair map.

18. Making the impression when the correct position is set, the machine must be kept fast with all possible pressure from the left hand and the strike is given sharply with a hard part (not the centre of the palm) of the right hand. The contact having once been made continued pressure should not be resorted to in the hope of getting a better impression. Usually this means blurred result on the other hand the holder should be prevented from snapping up by gently relieving the pressure and allowing it to rise slowly from the paper thus giving the ink every possible chance of leaving the type.

19. *Stroke*—To start with it is generally difficult to regulate the stroke. Small names require only the slightest touch while in large lettering it is almost impossible to hit too hard. Practice and sufficient confidence will soon overcome this difficulty and the typing will require little or no hand work on it afterwards.

20. *Importance of clean type.*—The cleaning of type that has been used is a very important matter and on it a great deal of success of typing depends. The impressions will never be clear or black unless the old and dry ink is removed from the face of the type nor will they be fine if face and hair lines of the type are destroyed by rough usage during the process of cleaning.

21. *Cleaning type.*—After an impression is taken and before the type is removed from the holder it can be cleaned by lightly passing over it a soft camel hair brush dipped in turpentine and then dabbing it gently with a piece of soft leather. The type should not be returned to the case without being dried as turpentine has enough sticking properties to cause small particles of dust to adhere. The typer should blow the case occasionally with a pair of bellows to prevent accumulation of dust.

For wiping out fresh ink off the type when in the holder, leather should be used and not cloth. The hairs of the rag get into the ink and spoil the impression rendering it woolly. Turpentine should not be used for cleaning types if the types are to be used immediately before allowing time for it to dry as the slightest trace of turpentine prevents the ink adhering to the type.

If by negligence, ink has become hardened on the letters they should be boiled in a pot in either a solution of soda or caustic potash. The types should afterwards be set on a type board and polished with a very soft brush dipped in the same. It should then be thoroughly rinsed with water to ensure all traces of the alkali being removed. A hard brush or old tooth brush should never be used nor should the face of the type ever be rubbed.

The somewhat irksome duties of cleaning and sorting should never be neglected but should form part of the daily routine.

22. Faults to be avoided. The principal faults to be avoided in typing are :—

(*a*) Typing not being parallel to graticule due to—

(i) holder loose or out of parallel with machine base.

(ii) machine slipping.

(*b*) Bad alignment of letter due to—

(i) mixed founts.

(ii) careless composition.

(iii) old type.

(iv) dirty holder.

(*c*) Uneveness of impression due to—

(i) machine not level.

(ii) dirty type or holder.

(iii) old type.

(iv) bad striking.

(v) bad mixing of ink.

(vi) uneven application of ink.

(*d*) Weak impression due to—

(i) bad setup of type.

(ii) types of various heights due to the mixing up of old and new types.

(iii) bad inking.

(iv) bad striking.

(*e*) Sunk impressions due to soft backing—No backing of paper at all is required for short words in small type and never more than two sheets of blotting paper for the largest types.

(*f*) constant erasers or corrections due to careless and inadequate guides.

APPENDIX No. XXIV.

RULES FOR THE DUE MAINTENANCE OF STORE ACCOUNTS AND RECOVERY OF COST OF LOST AND DAMAGED ARTICLES.

1. The Storekeeper in the Survey Unit Office will maintain—

(*a*) a stock book of Stores in Survey Form No. 64.

(*b*) an individual ledger in Survey Form No. 111 which will show the instruments for which section officers in field and heads of sections in office are responsible.

2. Instruments will be supplied to section officers in field and heads of sections in office on indents passed by the Assistant Director or the Office Superintendent.

3. Before issue to section officers in field, instruments should be carefully examined and the quality of each certified to by the Office Superintendent. In the case of a theodolite or circumferenter, the indent should be accompanied by a report of examination in common Form No. 75, which should be verified by every office into whose custody it passed at any time.

4. Instruments issued to section officers in field and those returned by them to the stores should be accompanied by invoices. For articles issued to heads of sections in office acknowledgment should be obtained in the column provided in the Register. Heads of Sections in office should enclose a list in duplicate of the articles returned. The duplicate copy of the list duly acknowledged should be returned to the section head who will preserve them, filed with the office copy of the store accounts maintained by him.

5 Issues and receipts should be booked and the balance struck at every transaction, and all vouchers filed until the necessity for their preservation ceases.

6. Each section officer will maintain—

(*a*) a stock book of stores in Survey Form No. 64.

(*b*) an individual ledger in Survey Form No. 111.

These will show transactions only by sub-sections and ranges, besides the individual account of the section office staff and the section officer.

7. The individual ledger should be posted on the first of each month from the stock book.

8. Each Range Deputy Surveyer will maintain an individual ledger in Survey Form No. 111 showing the instruments in the custody of himself and of his surveyors.

9. The instructions contained in rules 2 to 5 supra apply with the necessary modifications to section officers and Range Deputy Surveyors.

10. Each field surveyor will be supplied with the following survey instruments :—

1. Chain (20 metres)	1
2. Arrows	10
3. Wooden or bamboo standard pole 2 metres ...	1
4. Cross staff	1
5. Brass Compasses	1
6. Plotting and offset scales	1 set
7. Parallel ruler	1
8. Drawing pen	1
9. Drawing Board	1

He should keep these instruments neat and clean and in good condition. If any one of them becomes unfit for use he should return it to the Range Deputy Surveyor with a report regarding the date of supply, condition of the instrument at the time it was supplied for replacement by a fresh one.

11. Each field surveyor will submit with his diary for the second term of each month an instrument list, noting thereon the name of each officer who inspected the instruments in the month and date of such inspection.

12. Each Range Deputy Surveyor will check Surveyors' instrument lists with the ledger referred to in rule 8 supra, and submit them on the 3rd of each month to the section officer, together with a consolidated list of instruments in his range in Survey Form No. 68, with acknowledgements of or explanations for, any loss or damage to instruments by the surveyors responsible.

13. Each Head Surveyor will submit to the section office on the 3rd of each month a list of instruments in his custody.

14. The section officer will, on receipt of the returns mentioned in the last two rules, verify them and submit them with all enclosures to the Unit office on the 10th of each month together with a consolidated return in Survey Form No. 68. Instruments, in his section, reported lost but the recovery of the cost of which has not been intimated by the Unit Office, should be included in the returns until receipt of such intimation. A list of articles for which such intimation is due, date of original report, etc., should be enclosed to the return for verification and further action in the Unit office.

15. Every inspecting officer will, during inspection, check the surveyor's instruments, note their condition in their diary books and where any instruments are missing or damaged or otherwise unfit for use, make a special report immediately to the section officer so that steps may be taken to recover the cost and take immediate measures to replace such articles by fresh ones. When chains are found to be incorrect, they should be corrected by the Officer himself before he leaves the village and the surveyor should be reported for punishment. In special cases, such examinations may be made at outturn centres. The section officer will promptly submit every such report for the orders of the Assistant Director. Every such report should be referred to in the Store return mentioned in rule 14 Supra. Instruments in the personal custody of Head and Range Deputy Surveyors should be examined by the section officer once a month, preferably at outturn centres and similar action taken.

16. No subordinate in field or office should quit his post on leave or suspension, however short, without first handing over his instruments and records to his immediate superior who will then make necessary report. This rule will apply also to subordinates transferred. In urgent cases of leave, however, the surveyor may handover the instruments and records to the village munsiff or karnam and give him an acknowledgment receipt showing the number and name of the instruments and the nature of the records. The Village Munsiff or Karnam will then hand them over with the acknowledgement receipt to the Range Deputy Surveyor who will then make the necessary report.

17. The Field Surveyor is primarily responsible for every instrument issued to him.

18. The Range Deputy Surveyor is next responsible for instruments in the custody of his surveyors and being in constant touch with them, should be able to take timely steps to prevent instruments being lost without the possibility of recovery of their cost.

19. In the Unit Office, each head of a section will maintain an individual register in Form No. 111 in which he should obtain every month the initials of subordinates to whom articles are issued. Each head of a secion should on the first of each month submit a consolidated list of instruments in Survey Form No. 68, with himself and men under his control. Details of loss or damage to any instrument should be reported as it occurs with the explanation of the person responsible.

20. The Store-keeper will promptly verify with his books the instrument lists referred to in rules 14 and 19 *supra.*

21. Should there be disagreements between the account maintained by him and that submitted by the section officer, the Store-keeper will at once list the discrepant items and despatch the list to the section officer for immediate explanation or adjustment. The discrepancies in the lists submitted by heads of sections in office should be adjusted forthwith.

22. The Storekeeper will book in the Store Recovery Register, particulars of loss or damage to articles specially reported under rule 15, or ascertained at his verification under rule 20 supra (1) immediately where the loss or damage is acknowledged and (2) after receipt of explanations in other cases will submit the register with the file of papers, noting therein the cost of the instruments to be recovered at the latest cost prices, to the Assistant Director for orders.

23. The Storekeeper will on receipt of the recovery Register with the orders of the Assistant Director passed therein, promptly transfer it to the head accountant for effecting recoveries, the transfer being noted in the transit register wherein the Head Accountant's signature with date in token of its receipt should be obtained.

24. The head accountant is responsible for effecting the recovery in each case at the earliest opportunity possible. He should, after noting the details carefully in the rolls, return the Store Recovery Register duly filled in to the Storekeeper each time a recovery or set of recoveries shall have been made.

25. The storekeeper will then note the particulars of the recovery in the store recovery register, make necessary adjustments in his books and intimate the same to the section officer concerned to enable the latter to bring his books up to date.

26. Theodolites or circumferenters requiring repair must be sent to the Central Survey Office with a report in Form No. 128 (old). They should not be entrusted to local workmen unless the repairs are very trifling, such as the renewal of a screw.

27. Unserviceable instruments should not be kept in stock, but should be disposed of after obtaining the orders of the Joint Director of Survey and Land Records.

28. Stock of stores will be checked by the Assistant Director or the superintendent at least once a year and the result reported in the annual administration report. The Assistant Director should make a surprise check of the stores at least once a year and report the result to the Joint Director of Survey and Land Records.

29. The Balance stock of stores as on 31st March should be reported to the Deputy Director, Central Survey Office in the form of a return. The stock in the Central Survey Office must be checked at least once a year by the Assistant Director incharge or the Superintendent. The Deputy Director of Survey, Central Survey Office, should also make a surprise check of the stores at least once a year and report the result to the Joint Director of Survey and Land Records.

30. The Superintendent will, from time to time, examine stores and stationery and see that entries of receipts and issues agree with vouchers, that the articles entered against each head of a field or an office section correspond with the entries in the lists received from them and that the balance in store agrees with that shown in the registers. He should also see that the Store-keeper does not delay his reports regarding instruments lost, damaged or not duly accounted for by section officers and that the Head Accountant gives prompt effect to the orders of recoveries passed on such reports.

31. The Assistant Director should examine, while in camp and at inspections, the instruments of as many, surveyors as possible with a view to secure accuracy of the Surveyors Store accounts and replacement and recovery of cost of articles worn out lost or damaged. He should also examine the stock books and individual ledgers maintained by Section Officers. He should examine the stock books in his office at the beginning of each month.

32. The cost of instruments, which becomes impossible of recovery for want of correct or timely information, report or action, will be recovered from the person responsible for the lapses.

33. The percentage of depreciation allowed for Store articles and the several instruments in Survey Unit, and Central Survey Office are furnished at the end.

34. Fresh instruments should not be supplied at the end of the periods fixed for wear and tear as a matter of course as many of the article should be found quite serviceable at the end of those periods. The period of wear and tear has been fixed merely as a guide. Fresh articles should be supplied without demur if the periods fixed has been exceeds and the article is certified to be unserviceable. If by bonafide accident or unavoidable hard and continuous use, an article becomes unserviceable before the expiry of the period fixed such article may be replaced at Government cost and the special sanction of the Board obtained for the condemnation of the instruments. Spare brass indices for chains should always be supplied at Government cost. Spare brass handles and spare arrows should not be supplied at Government cost unless the period of wear and tear, allotted for the chain or set of arrows has already expired. Unserviceable articles should not be mixed up with the articles intended for supply to the staff. Arrows should not be treated as unserviceable but should be added to the stock in the register prescribed. Serviceable brass handles and indices should be removed from the old stock and entered in the regiser as above. The other parts and instruments should be sold in auction as scrap iron or wood and the sale proceeds should be credited to "029—LR—01—(c) Survey and Settlement Operation—Other receipts".

A reserve stock of 10 percent of the number of instruments of each kind in actual use in the Survey Unit should be maintained so that the old and unserviceable instruments may be renewed without delay. A reserve of 10 percent of spare parts of the chain (i.e.) brass indices, arrows and brass handles should also be maintained.

35. To replenish the stock in his office, the Assistant Director will prepare an indent in the form prescribed and send it to the Deputy Director of Survey, Central Survey Office and the Board of Revenue as the case may be. Indents to the Board of Revenue should be sent so as to reach that office not later than 1st June of every year. Indents for the instruments required from the Central Survey Office should reach the Deputy Director of Survey not later than the 1st July every year.

LIST SHOWING THE AMOUNT OF DEPRECIATION ALLOWED FOR STORE ARTICLES ISSUED IN THE TAMIL NADU SURVEY AND LAND RECORDS DEPARTMENT.

Serial number.	*Description of Store Article.*	*Percentage of depreciation allowed per annum.*
(1)	(2)	(3)
1	Arrows for chains	25
2	Badges, Silver, Duffadar	5
3	Badges, brass coated with silver, duffadar	5
4	Badges, brass, head peons	5
5	Badges, Silver, head peons	5
6	Badges Brass, peons	5
7	Badges aluminium, head peons	5
8	Badges aluminium, peons	5
9	Barometer, aneroid	25
10	Bars, magnet	3
11	Belt for duffadar	25
12	Belt for peons	50
13	Boards, drawing 1 c.m. thick	10
14	Boards, drawing $2\frac{1}{2}$ c.m. thick	10
15	Brass indices	100
16	Cases teakwood for types	5
17	Cash chest wooden	5
18	Cash chest iron	5
19	Chains	50
20	Chisels, iron	50
21	Circumferenters with vernier and telescope barbers pattern	10
22	Circumferenters with vernier and telescope self levelling	10
23	Clinometers	10
24	Clocks	5
25	Colour boxes	10
26	Colour brushes	100
27	Colour Spare	100
28	Compasses, beam	15
29	Compasses brass, fine pointed	25
30	Compass magnetic	10
31	Compass prismatic	10
32	Compass proportional	15
33	Cross heads, aluminium	10
34	Cross staff, Male bamboo	20
35	Cross staff, ordinary bamboo	[illegible]

Serial number. (1)	Description of Store Article. (2)	Percentage of depreciation allowed per annum. (3)
36	Curves, french	10
37	Cyclostyles	10
38	Glass magnifying	3
39	Glass tracing in frame	10
40	Gum bottles	10
41	Hammers, Iron	25
42	Hand presses with sticks	10
43	Hones	12
44	Ink bottles earthen or glass	10
45	Ink stand wooden (Strays or boxes)	10
46	Mapping pins	25
47	Mathematical instruments in box	10
48	Padlocks clubs brass	5
49	Padlocks clubs iron	50
50	Pantagraphs in case	10
51	Paper weights	10
52	Pens, bow or circle drawing	50
53	Pens, drawing spare	100
54	Pens, road or double	50
55	Penknives	25
56	Plane table with stand	15
57	Protractors, brass circular	12
58	Protractors, brass semicircular	12
59	Protractors, ivory, 30 centimetres	15
60	Protractors, ivory 15 centimetres	5
61	Roller for finger print with pad	15
62	Rules, brass, parallel, rolling	10
63	Rules, ebony, parallel, rolling	15
64	Rules, ebony parallel, rolling brass edge	10
65	Rules, brass 15 c.m. with bars	50
66	Rules, flat brass 120 cm.	3
67	Rules flat brass 90 cms.	3
68	Rules, flat, blackwood 38 cms.	30
69	Rules parallel, blackwood 38 cms.	50
70	Rulers round	10
71	Saucers for mixing colours	25
72	Scale, computing with box	15
73	Scales, letter weighing with weights	10
74	Scales, marquis	25

Serial number.	*Description of Store Article.*	*Percentage of depreciation allowed per annum.*
(1)	(2)	(3)
75	Scales plotting box wood	25
76	Scales plotting box wood with offsets	25
77	Scales plotting ivory	10
78	Scales bit	10
79	Scissors	20
80	Scales date with movable figures	10
81	Sight vanes	20
82	Slates	25
83	Standard teak wood	25
84	Standard ordinary bamboo	59
85	Standard Male Bamboo	50
86	Stencil plates	100
87	Straps	12
88	Stulographic pens	50
89	Symbols brass (arrow mark)	10
90	Tape measuring	100
91	Theodolites everest	10
92	Theodolites transit	10
93	Thermometer	20
94	Type cleaning brush	100
95	Types, printing	25

APPENDIX No. XXV.

LIST OF RECORDS TO BE RETAINED AS WELL AS OF THOSE DESTROYED IN THE DISTRICT SURVEY UNIT OFFICE.

I. CORRESPONDENCE SECTION.

Correspondence.

To be retained.

Subject.	*Remarks.*
1. Important Government Orders and Board's proceedings.	
2. Papers containing important orders of the Director regarding the system of work and procedure.	
3. Reports on matters of special interest.	

To be destroyed.	*After years.*
1. Lodged files	2
2. K. Dis. files	3
3. D. Dis. files	10
Other miscellaneous.	
4. (*a*) Petitions and copy applications closed under L. Dis.	1
(*b*) Petitions and copy applications closed under K. Dis.	3

Periodical returns.

To be retained.

1. Annual Administration Reports.

To be destroyed.

1. Other periodical reports and returns.	3

Registers and files.

To be retained.

1. Index Register ... ... 2. File of Circular orders ...	To be preserved in the District Survey Unit Office.
3. Registers of Land Complaints and Appeals. 4. All files connected with land complaints, appeals and boundary disputes.	To be sent to the Central Survey Office on completion of the taluk in all respects.

42-29—30

To be destroyed.	*After years.*
1. Distribution Register ...	5
2. Register of papers issued from and returned to the record room.	5
3. Stamp accounts book ...	3
4. Order Book	2
5. Calendar of returns	2
6. List of Office Books	2
7. Landed property statements ...	To be attached to the service register of the individual.
8. Special files relating to conduct of surveys in particular localities, Government or proprietary.	20

II. ACCOUNT SECTION.

Gazetted Officers.

To be destroyed.	*After years.*
1. Acknowledgment of permanent and temporary advances.	3
2. Officers' diaries	3

Establishment.

To be destroyed.	*After years.*
1. Rough Pay bills of office and field establishment with leave statements.	45
2. Acquittance rolls pay	45
3. Acquittance measurement allowance.	5
4. Register of travelling allowance of establishments.	5
5. Register of men dismissed or discharged whose re-entertainment is prohibited.	20
6. Punishment register	20
7. Nominal rolls	5
8. Last pay certificate	3
9. Outturn statements on field establishment.	2
10. Casual leave applications and register (including compensation leave).	3
11. Register of acquittance rolls ...	5

CASH.

To be destroyed.	*After years.*
1. Cash book	5
2. Advance book	5
3. Contingent register	5
4. Register of bills received ...	5
5. Register of bills issued ...	5
6. Abstract and detailed contingent bills.	5
7. Chalans	5
8. Vouchers (travelling allowance, contigencies, etc.)	5
9. Miscellaneous files (money order coupons, payees receipts etc.)	5
10. Special bills for estates, etc ...	5
11. Objection slips	3
12. Pay distribution book	1
13. Cash abstract register	1
14. Daily contents of cash chest ...	1

PENSIONS.

To be retained.

1. Records of cases which establish a rule or precedent.
2. Service books of permanent subordinates.
3. Service registers of temporary subordinates.

PERIODICAL RETURNS.

To be destroyed.	*After years.*
1. All periodical reports and returns.	1

III. STONE ACCOUNTS SECTION.

To be destroyed.	*After years.*
Registers and files.	
1. Register of stone pass lists ...	10 Or such shorter period when the necessity for their retention should cease.
2. Register of Depot accounts ...	
3. Register of village stone accounts.	
4. Register of Carriage of stones.	3
5. Progress register of landholders' bills.	3
6. Indents	3
7. Statements of charges recoverable from landholders (Pattadars' lists).	5
8. Register of landholders' bills and charges debitable to Government.	5
9. Credits, debits and balance accounts of temporary advance.	5
10. Rough Pay bills (Chainmen) ...	45
11. Rough measurement allowance bills.	5
12. Register of cooly bills received...	5
13. Cooly vouchers of field subordinates.	5
14. Files of contractors and Survey Officers' bills.	5
15. Pattadars' sketches	5
16. Muster rolls of Chainmen ...	5
17. File of thumb-impressions ...	10
18. Stone muchilikas	To be sent to the Central Survey Office on completion of the work in the taluk.

PERIODICAL RETURNS.

To be destroyed.	*After years.*
1. All periodical reports and returns.	

IV. RECORDS SECTION.

RECORDS AND REGISTERS.

To be retained.

1. Original Survey Records—	
Boundary demarcation sketch. Traverse field books ... ... Traverse sheets ... ... Field Measurement Book ... Village Map	To be sent to the Central Survey Office for preservation.
Acknowledgements of notice under section 8.	To be sent to the Collector one year after the expiry of appeal time.
Field Register	The Settlement Officers or the Special Revenue Officers should send this registers finally to the Collector for preservation.
Acknowledgments of notice under section 9 (2).	To be sent to Central Survey Office, Madras, for preservation.
2. Supplemental Survey Records—	
Traverse Field Books ... Traverse sheets ... ... Khandam sketches ... ... Field Measurement Book ... Village Map	To be sent to the Central Survey Office for preservation.

To be destroyed.

Rough area list (with area times). Inspection reports	Three years after publication of notification under section 13 of the Act VIII of 1923.
Final Examination reports (Field and Office).	To be retained in the District Unit Office and destroyed one year after the date of despatch of the records to Central Survey Office.
Acknowledgments of notice under section 8.	To be sent to the Collector one year after the expiry of appeal time.
Acknowledgments of notice under section 9 (2).	To be sent to Central Survey Office, Madras, for preservation.

NOTE.—12 (i) notification acknowledgments for surveys done under Act IV of 1897 have been sent to the Collector for preservation.

3. Re-Survey records—

Traverse Field Books ... Traverse sheets ... ... Field Measurement Book ... Village Map	To be sent to the Central Survey Office for preservation.
Acknowledgments of notice under section 8.	To be sent to the Collector one year after the expiry of appeal time.
Acknowledgments of notice under section 9 (2).	To be sent to the Central Survey Office, Madras, for preservation.

4. Town Survey Records—

Index map ... ... Traverse field books ... Traverse sheets ... ... Road map ... ... Field demarcation sketches ... Rough block maps ... ... Record of measurement ... Fair block maps ... ... Area lists ... ... Traverse skeleton plots of wards ... ... Traverse skeleton plot of the town	To be sent to the Central Survey Office for preservation.
Acknowledgments of notice under section 8.	To be sent to the Collector one year after the expiry of appeal time.
Acknowledgments of notice under section 9 (2).	To be sent to the Central Survey Office, Madras, for preservation.

5. Street Survey Records—

Demarcation sketches ... ... Traverse Field books ... Traverse sheets ... ... Tie line field books ... ... Field measurement book ... Composite map ... ... Eye sketch of composite map.	To be sent to Central Survey Office for preservation.
Acknowledgment of notice under section 8.	To be sent to the Collector one year after the appeal time.
Acknowledgment of notice under section 9 (2).	To be sent to Central Survey Office, Madras, for preservation.

6. Register of inspection of field work.	To be preserved in the District Unit Office.
7. Register of village records ...	

To be destroyed.

1. Register of records received and returned.	10 years.
2. Register of records issued (to sections).	10 years.
3. Register of invoices of records received or supplied.	10 years.
4. Progress register of area measured in field.	One year after completion of taluk in all respects.
5. Progress register of EF records received in office.	
6. Quarterly return of inspection of field work.	
7. Discrepancy lists with field correction lists.	
8. Miscellaneous records, e.g., test correction lists, rough sketches, rough traverse sheets and miscellaneous papers not required.	

ORIGINAL SURVEY RECORDS.

9. Field demarcation sketch ...	One year after the date of despatch of village maps to Central Survey Office for publication.
10. Inspection reports	Three years after publication of notification under section 13 of Act VIII of 1923.
11. Purtal sketches	
12. Rough area list (with area times.)	
13. Final examination reports (field and office).	One year after the date of despatch of village maps to Central Survey Office for publication.

RE-SURVEY RECORDS.

14. Khandam demarcation sketch ...	One year after the date of despatch of village maps to Central Survey Office for publication.
15. Inspection reports	Three years after publication of notification under section 13 of Act VIII of 1923.
16. Purtal sketches (except of villages adjoining non-Government villages)	
17. Rough area list (with area times)	
18. Final examination reports (field and office).	One year after the date of despatch of village maps to Central Survey Office for publication.

Town Survey Records.

19. Inspection reports	After the date of the publication of the Town Survey Records.
20. Final examination reports ...	

Street Survey Records.

21. Inspection reports	After the date of the publication of the Street Survey Records.
22. Final examination reports ...	

V. STORES SECTION.

Books and Periodicals.

To be retained.

1. Regulations and Acts.
2. Books supplied by Government to the Office Library.

To be sold.

1. Periodical publications superseded by later issues.	3 years.
2. Superseded editions of books other than Acts, Codes and official orders when not likely to be required again.	3 years.
3. Fort St. George Gazette files.	Concerned sheets alone might be filed separately and the rest destroyed at the end of the year.
4. District Gazette files	

Registers.

To be retained.

1. Statistical register	To be sent to the Central Office on completion of taluk or estate.

To be destroyed.	*After years.*
1. Stock book of stores	15
2. Stock book of stationery ...	5
3. Stock book of forms ...	5
4. Invoices of stores received and supplied.	10
5. Individual ledger of instruments.	3
6. Instruments lists	3
7. Stores recovery register ...	To be destroyed when out of date
8. Register of packages received.	3
9. Register of packages issued ...	3
10. Indents and vouchers for stores, stationery, etc.	3
11. Diaries of field subordinate (all grades).	3
12. Attendance roll	3
13. Calendar of work reports ...	1

VI. MAPPING AND COMPUTATION SECTIONS.

REGISTERS.

To be retained.

1. Register of village areas.

To be destroyed.

1. Individual register of daily outturn of Junior Computor-Draftsmen.	3 years.
2. Monthly abstract statement of outturn of Junior Computor-Draftsmen.	3 years.
3. Diaries of Computor-Draftsmen and Manager.	3 ,,
4. Day book of outturn	3 ,,
5. Progress register of process 'A to H'.	3 ,,
6. Register of persons responsible for each sub-process.	3 ,,
7. Register of probationers ...	3 ,,
8. Villagewar register of outturn of Junior Computor-Draftsmen.	To be destroyed one year after the completion of the taluk or estate in all respects.
9. Register of miscellaneous items of work.	
10. Sub-section progress register of G. and H.	
11. Progress register of G and H by sub-process.	
12. Progress sketches	

VII. MISCELLANEOUS.

REGISTERS AND FILES.

To be destroyed.

1. Registers maintained by Inspector of Survey and Land Records and Head Surveyors in field.	To be sent on completion of taluk, etc., to the District Unit Office where they will be preserved for another three years.
2. Personal registers	5
3. Acknowledgment receipt, etc., other than for records or stores.	5
4. List of stores in each section.	1

APPENDIX No. XXVI.

Instructions for investigation and settlement of boundary disputes under the Tamil Nadu Survey and Boundaries Act VIII of 1923.

1. The investigation and settlement of disputed boundaries under the Tamil Nadu Survey and Boundaries Act VIII of 1923 rest with the Survey officers appointed as such by Government, under section 4 (1) of the Act. A brief description of the powers conferred on the several classes of survey officers has been specified in the Schedule under the rules under clause 2 (c) of section 26 of the Survey and Boundaries Act found in Appendix I B.

2. Petitions would be received normally after commencement of the survey, following the publication of the notification under section 6 (1) of the Survey and Boundaries Act. Petitions not being appeals on decisions already passed either under section 9 (1) or 10 (1) of the Survey and Boundaries Act must be registered in the first instance in a register for petitions received. Those which are appeals on decisions already passed under section 9 (1) or 10 (1) of the Act should be registered in the Registers in Survey Form No. 48 or Survey Form No. 49, as the case may be. The appeals against decisions on village boundary disputes are to be registered in the Register in Survey Form No. 48 and appeals against decision on field boundary disputes should be registered in the Register in Survey Form No. 49. Petitions and appeals regarding disputed boundaries presented to any survey Officer should be submitted to the Head Office of the Survey Unit where they will be registered.

3. Land complaint petitions must ordinarily be received in the Printed Survey Form No. 31. Petitions received in manuscript need not be returned simply for presentation in the printed form, if all the information required is available in the same.

4. On court fee lables attached to petitions or appeals the date stamp should be applied in such a manner as to cover or touch some part of the stamps, but not in such a way as to obliterate the entries thereon or to render the detection of any forgery more difficult. The stamp should then be cancelled by punching or by removing the figure head completely with a circular punch.

If the petitions or appeals are insufficiently stamped the date stamp should not be applied to the stamps on it, nor should the stamps be cancelled by punching out the figure head. They should be returned to the parties concerned for resubmission, properly stamped,

Stamps affixed to petitions in excess of legal requirements should be punched. No refund or renewal can be granted, where the amount of the excess value is less than a rupee. In cases where the value of the excess stamps is not less than one rupee. the party concerned will be allowed refund of the amount after deducting five paise in the rupee or fraction of a rupee. He should be given a certificate in the first portion of the Form sent to the Treasury Officer. Stamps themselves, should on no account be removed from the petitions and returned to the parties.

Petitions or appeals which do not clearly describe the locality in dispute should be returned for resubmission with complete information.

5. Appeals against orders passed by Survey Officers under section 10 (1), if not accompanied by the order appealed against should be returned for resubmission with a certified copy.

6. Separate stamped petitions are to be submitted for complaints relating to different villages and different pattas.

7. When a complaint relates to more than one boundary and there are different sets of defendants for each one of these boundaries, the submission of separate petitions for each different set of defendants should be insisted on. It is enough if one of the petitions relating to a village is stamped. When there are more defendants in complaint, the petitioner should be asked to submit as many copies of petitions as there are defendants plus one.

8. When a petition or appeal is returned with an endorsement to present it again duly amended or with omission supplied, the endorsement should duly specify the period within which it should be represented, failing which the petitions or appeal is liable for rejection. One month should ordinarily be enough but the Officers should exercise their discretion in fixing up the period in each individual case.

9. The settlement of disputes as to water right easement, right of way, etc., is not within the competence of survey Officers. Petitions in regard to the above must be returned with an endorsement informing the petitioner as above.

10. Survey Officers have no authority to decide on registry. In cadastral Surveys, the Revenue or Settlement staff deal with them. Petitions received in this regard should be returned with suitable endorsement.

In street surveys, the registry is recorded by the Survey Department after informal enquiry. Complaints against registry in street surveys should be informed that the registry represents what has been ascertained by informal legal enquiry, and those dissatisfied should prove their title in a Civil Court.

11. Petitions in regard to exhibition of topo details are not to be treated as land complaints. They have to be treated as ordinary petitions and a responsible Officer not below the rank of a Deputy Surveyor should be deputed to enquire and report. The orders passed should be communicated to the parties concerned.

12. Petitions relating to boundary complaints after being registered in the general petitions register should be sent to the section Officer to get the preliminary enquiry done by a competent Field or Deputy Surveyor. Copies of Survey Form Nos. 31 and 53 should be enclosed for resubmission duly filled up. Copies of the sketches and an extract of the land Register for the Survey field relating to the complaint and those fields adjoining the disputed boundary should be enclosed to the petition if the records have been received in Head Quarter Office.

13. The following are the instructions for preliminary enquiry on land complaints.—

(i) The Surveyor must find out the correct names and addresses of the plaintiffs and defendants and note them on the top of his report as it is likely that the information furnished in the petition is either incorrect or insufficient. He must note the names with the addresses at the top of page 2 of the land complaint booklet (Form No. 53B) intended for the preliminary enquiry report.

(ii) He must report who accompanied him viz., the petitioner, defendant or other respectable ryots or village officers.

(iii) The Surveyor must read the petitions thoroughly and satisfy himself that the site indicated by the party on the ground is the same as that mentioned in the petition. If it is different, the party should be asked to submit a separate complaint.

(iv) If the petitioner finds during the preliminary enquiry that he has no complaint in one or more of the cases mentioned in the petition, the preliminary enquiry Surveyor should obtain from the petitioner statements to that effect signed by the petitions and contersigned by the Village Officer.

(v) During inspection of the site, he must properly identify and note the positions of all stones connected with the disputed site and measure and record in page 3 of the Booklet, all lines and offsets required to plot the site under dispute.

(vi) The disputed plot must be indicated with yellow wash in the preliminary enquiry sketch and all new lines must be drawn in red ink. The measurements of all the lines newly measured including offsets and cutting points must be in red ink.

(vii) He should compute and enter the area of disputed plot on the top of the sketch and also note the scale of the map.

(viii) He must report the nature of the disputed plot, i.e., whether cultivated wet or dry, or uncultivated, and how it is being utilised.

(ix) He must report whether the disputed plot is on the same level with the petitioner's or defendant's land.

(x) He should note whether any trees, buildings, shed, tank, pond. ditch, well or any other topographical details exist in the disputed plot.

(xi) He should report as to how the measurements of the present survey compare with those of the previous survey, if any.

(xii) He should report the grounds on which the petitioner claims the disputed plot.

(xiii) If the parties produce any documents, the site should be measured with reference to the measurements therein and the result recorded.

(xiv) The surveyor should obtain the signature of the petitioner underneath the sketch in page 3 of the booklet and also affix his signature beneath it.

(xv) The surveyor must not write any remarks leading to a decision of the complaint.

(xvi) He is forbidden to reveal his remarks in page 2 to any private individual.

(xvii) He should refrain from recording any statements other than those mentioned against question 5.

(xviii) The preliminary enquiry surveyor should obtain from the petitioner, as many copies of the petition with sketches as there are defendants in case sufficient number of copies have not been sent already by the petitioner with his petition originally.

14. In regard to complaints under section 10 (1) received when the work is in progress and the sub-section officer's, inspection of the Kandham has not been completed, the Survey Officer himself may do the preliminary enquiry and record his report in page 2 of the booklet more or less on the same lines as the preliminary enquiry surveyor should do and give his reasons for his personal inspection.

15. The preliminary enquiry reports submitted by the preliminary enquiry surveyors should be scrutinised carefully by the section officer and defects, if any noticed should be got rectified before submitting the file to the Headquarter office.

16. On receipt of the petition file with the preliminary enquiry report, the head clerk and Superintendent should scrutinise the petition file and fill up details in survey Form No. 53C and append remarks as to whether the petition is fit to be accepted.

17. The names of plaintiffs and defendants noted in the land complaint booklet in survey Form No. 53C should agree with the names written in the land register.

18. In the case of complaints affecting the lands acquired by Government and vested in local bodies and other lands vested in local bodies, the Tahsildar should also be made a party besides the President or Chairman of the local body.

19. In respect of complaints affecting lands belonging to a local body, the President or Chairman of the local body should alone be made a party and not the Revenue Department.

20. In respect of complaints affecting the boundaries of lands vested in the Special Departments like P.W.D., Forest or other Special Departments, the district head of the department should be impleaded as a party and not the Tahsildar.

21. Complaints preferred by ryots regarding incorrect demarcation of communal porambokes should be accepted. No Court-fee labels need by affixed to them. A copy of such complaint should be sent to the Tahsildar, together with a notice of the date of hearing, and a summon to the karnam to appear with records, requesting him to take necessary action to see that the interests of Government are properly represented.

22. Petitions claiming part or whole of the adjoining land separately measured and registered are to be treated as boundary disputes. Petitions claiming whole or part of land not adjoining the petitioners land is only a dispute regarding ownership of land, i.e., a registry complaint and is not a boundary dispute. For example, if the

registered holder of subdivision No. 1 claims whole or part of adjoining subdivision 2, it is a case of land complaint but if the registered holder of subdivision claims part or whole of a subdivision not adjoining subdivision No. 1 it is a registry dispute and not a boundary dispute.

Complaints alleging incorrect part measurements, in a street survey record in respect of the properties adjoining the street limits are also to be treated as land complaints and enquired into even though this is not a complaint regarding the boundary between the street and the adjacent properties. In these cases, it is enough if the President, Panchayat Board is summoned as a witness. The holder or holders of the adjoining properties will be the defendants.

23. In regard to appeals, the main items for examination before acceptance are whether (1) the appeal petition is properly stamped, (2) a certified copy of the order appealed against is enclosed; and (3) the appeal is not time-barred or that the delay if any has been properly and satisfactorily explained.

24. After orders are passed by the Survey Unit Officer, accepting the petitions or appeals, they are to be entered in the appropriate registers and they are to be enquired into by the Survey Unit Officer or sent to such subordinate officer, for enquiry and disposal, as may be directed by the Officer.

25. One copy of the decision under section 9 (1) should be affixed to the original field measurement book and another copy must be assigned a number in the land complaint Register for original field boundary disputes. The decision of a Survey Officer under section 9 (1) should be assigned a number and brought to the Register of Field Boundary disputes in Form No. 47 and sent to the Central Survey Office along with the land complaint files to be retained there permanently.

26. The Section Officer should also maintain separate Registers for village and field boundary disputes and for appeals against decision on village and field boundary disputes. The petitions or appeals received in the section for disposal should be entered in the appropriate registers before he himself takes up the enquiry or send the files to the Survey Officer concerned as directed by the Survey Unit Officer.

27. Enquiry should be made of all complaints mentioned in the petition even though there is omission of any number in the Head Office docket. (The Survey Officer should not, however, go into complaints not mentioned in the petition even though the preliminary enquiry surveyor has by mistake or purposely noted them in his report or sketch.)

28. When a survey number or subdivision, whose demarcation is complained about, is registered in the names of two or more persons, the survey officer should cite them all as parties to the case even though one or more registered holders are not signatories to the petition. The legality of the proceedings will be vitiated if the hearing is taken up without the issue of summons to all the registered holders. If all the registered holders do not then sign the complaint, it should be struck off the file.

29. Sometimes, complaints are not clearly stated in the petition and it may happen that at times, registry complaints are accepted by mistake. But the nature of dispute should be clear enough, after the preliminary enquiry sketch is made out. The Survey Officer should not enquire into complaints which are not of the nature of a boundary dispute on the plea that the head office has accepted them as land complaints but strike them off, referring the party for redress to the settlement department or the appropriate authority.

SUMMONING OF PARTIES.

30. The summons should be issued to the parties six weeks in advance of the date of hearing to allow sufficient time for proper service and for the parties to prepare themselves. The summons should be sent out with instructions regarding the mode of service in cases where the Survey Officer has reason to think that direct service may not be possible.

For land complaints and appeals affecting the interests of Government or local boards, the interval between the issue of summons to the Tahsildar or the local board authorities and the date of hearing should not be less than two months.

31. Inregard to the service of the summons, the Survey Officer should be guided by the rules in the C.P.C. printed in Appendix X of the Tamil Nadu Survey Manual.

32. The summons should contain invariably the following foot note : The proceedings of the Survey court being summary no adjournment will ordinarily be granted.

33. Before taking the cases for enquiry, the Survey Officer should see whether all the registered holders of the fields in dispute have been duly summoned and their acknowledgements are on file. If any of the registered holders has not been summoned, the reasons therefor should be investigated and action taken. No case is to be disposed of, unless all the registered holders of the disputed plot are duly summoned and the served summons are also received back, **unless parties are present in court.**

34. In original complaints and appeals about the boundaries of the lands affecting the interests of Government before a Survey Court the Survey Officer should give notice of such complaints and appeals to the district heads of the Public Works Department, forest or other special departments in respect of the lands vested in them, to the Tahsildar of the taluk in respect of other Government lands (including Government lands vested in local bodies) and to the President or Chairman of the local body concerned, in respect of land belonging to or vested in a local body. A copy of the preliminary enquiry surveyor's sketch and a copy of the original or appeal petition, as the case may be, should be sent with every notice. A copy of the sketch will not be necessary, in the case of an appeal over a decision under section 10 (1) if one has already been supplied with the original petition.

35. The nature of complaint stated at page 4 in the decision form should be self-explanatory. It should invariably begin as follows "that a piece of land alleged to be under the possession and enjoyment of the plaintiff, on the..................side of S. No............... of V. No......................of.......................Taluk was incorrectly included in the present survey in survey number......................... of the defendant and that the wrong demarcation may be set right"

ADJOURNMENTS.

36. Adjournments should not ordinarily be granted. In really convincing cases, the Survey Officers may exercise their discretion and grant adjournments.

37. If adjournment is ordered by the Court, it should be noted in page 1, with reasons therefor, and signatures of parties present in court obtained below it. Fresh summons should be issued to the absentees, if any. If an adjournment is granted on the request of parties, their petitions should find place in the file with the orders of the Survey Officer therein and signatures of parties noting it. Adjournment petitions need not bear any court-fee stamp.

38. In all cases where a land complaint or any appeal is adjourned either by the court itself or on the application of the parties, notice of adjournment should be given to all the absentee parties, unless of course, the court proceeds with the case, day-to-day.

EXAMINATION OF PARTIES AND WITNESSES.

39. Parties to the complaint may be represented either by a duly authorised vakil, holding vakalath, or by any agent holding general or special power-of-attorney.

40. Vakalathanama should bear court fee stamp to the value of rupee one and 50 paise and special powers of attorney should be on the stamp paper worth Rs. 1.50 and should be attested by two witnesses. If the agent holds a general power of attorney from his principal on stamp paper worth Rs. 7.50 it may be accepted and returned to the party after making a note of having seen the general power of attorney in L.C. file at page 4. No person can be accepted as a representative on the ground of his nearest relationship or for any other reasons not covered by the above instructions.

41. The scope of Vakalath filed before a Survey Officer will have to be determined on the terms of the particular vakalath in question. The provisions of order 3, rule 4 of C.P.C. as amended in 1926 allowing the applicability of a vakalath filed in a suit to the prosecution of an appeal from a decree therein would apply to survey courts. If the vakalath in the lower court does not confer authority to appear in the appeals, a fresh vakalath should be obtained for the appeal.

42. The deposition of the L.G.G.S. of the Court should be obtained for having called the names of the parties who are absent.

43. Whenever exhibits are filed, a list of those should be received with the signature of the parties concerned. On every such document thus admitted the number of the land complaint and the initials of the Survey Officer with date should be written.

44. Whenever any one of them is returned, the signature of the party to whom it is returned should be obtained in the booklet against the entry for exhibit and a remark to this effect made in the list itself. The list should form part of the L.C. file.

45. A list of witnesses to be examined should be obtained both from the plaintiff and the defendant and filed.

46. Decisions should be clear and self sufficient. Nothing should be left to the correction surveyor's discretion. For instance, a decision to alter a boundary according to old measurement so as to include certain trees is vague. It is the duty of the Survey Officer to define clearly what part of land is to be excluded or included.

47. The Survey Officer should not, however, go into complaints not mentioned in the petition even though the preliminary enquiry surveyor has by mistake or purposely noted them in his report or sketch.

48. When the contending parties come to a compromise, they should be directed to draw up and file a petition setting forth the terms of the compromise. The Survey Officer should obtain sworn deposition from them that they agree to the terms of the compromise in the petition filed and pass decision in terms of the compromise.

49. It is unnecessary to examine a large number of witnesses if the examination of some of them can conveniently be dispensed with at the discretion of the Survey Officer.

50. Depositions should be taken in the language to which the party is familiar and if the Survey Officer is not taking down depositions himself, he should make a memorandum of the substance of the same in his own handwriting. Such memorandum should form part of the L.C. file. When he records the depositions himself, he should correct the certificate "taken down before me" as "taken down by me".

51. The party withdrawing the complaints should be asked to give a sworn deposition.

52. Whenever an appeal is heard a note should be made of all the important points argued and this memoranda must be attached to the file of the L.C. papers. In the case of appeals on a decision under section 9 (1) depositions must be recorded as in the case of original complaints.

53. In the case of appeals on orders under section 10 (1) of the Act, if additional evidence is allowed by the Appellate Court, the Court shall record the reason for its admission.

DISMISSALS.

54. The case should be dismissed on the day fixed for hearing if the plaintiff or appellant is absent and the defendant does not admit the claim. In such dismissals the survey demarcation should not be confirmed, as the case is not decided on its merits.

55. Complaints should not be dismissed on the ground that the appellant or respondant has instituted a Civil Suit. The enquiry should be proceeded with and decided as the settlement of a boundary dispute by a Survey Officer under Act VIII of 1923 is altogether unconnected with any pending suit regarding possession before a Civil Court, which adjudicates independently of the Survey Officer's proceedings.

56. The Survey Officer's findings should as far as possible be based on the documentary evidence available and too many lengthy depositions need not be taken.

57. The exhibits should be briefly dealt with in the discussion of evidence, in the order in which they were filed and such exhibits on which the Survey Officer relies should be commented on.

58. The order should more or less be a precis of the arguments under the head "evidence-documentary or oral discussed". It is not sufficient to simply state in the order. "I confirm the present demarcation" or "I order that the demarcation of the disputed locality is to be revised". The reasons for doing so should be found in the order. If it would make an order inexplicable without a lengthy description, it is best to append in the margin, a sketch of the boundary in question and note the demarcation points that require alterations by symbols A.B.C. etc., and wind up stating that A should be removed by 50 links South, B should be removed altogether etc.

59. No decisions are to be passed, recognising the right of persons to trees on poramboke lands. The parties are to be directed to seek redress in the Revenue Department. A Survey Officer can decide disputes only regarding the boundaries of fields.

60. Mapped field boundaries should not as a rule be altered as corrections would deface the village map, rendering them unfit for Vandyke (*See* rule 4 and 5 of Appendix XIII of the Survey Manual). Disputed plot or whatever portion of it is adjudicated to belong to the aggrieved party should, in such cases, be formed as sub-divisions and ordered to be registered in the name of the aggrieved party.

61. When a Survey Officer refers, in the course of a discussion of evidence or decision, to certain old survey records which are not already in the L. C. file, he should take a certified copy from the records which he has perused and file them in the L. C. file.

COMMUNICATION OF DECISION.

62. As far as possible, cases should be disposed off, on the final day of hearing and the decision communicated in person to parties who are present. In such cases, the acknowledgements of the parties present are to be taken on the file itself. As far as possible, copies of decisions intended to absentee parties should be served through the L.G.G.S. attached to the Survey Officers. In cases where this is not practicable, they should be sent by registered post acknowledgment due.

63. A copy of the decision should be furnished separately to each one of the joint holders also.

64. When a party refuses to receive the copy of the decisions sent by registered post and if the refusal is certified to by the postal authorities, no further attempt to communicate the decision need be made, but when the decision is received back from the D.L.O. owing to wrong or incomplete address a fresh attempt should be made for communication to the party through the Tahsildar of the Taluk.

65. In all cases to which the Government are a party the Survey Officer should communicate forthwith the purport of the decision to the Collector through the district head of the department concerned in respect of lands vested in the Public Works, Forest, Education and Excise or other Government Department and through the Tahsildar in respect of other Government lands including Government Lands vested in local bodies. In all such cases, the Survey Officer should also send to the Collector without delay, through the same channel, a copy of his decision and the discussion of evidence, with sketch, when necessary. In the case of Government lands vested in local bodies, copies of the decision and the discussion of evidence with sketches when necessary should also be sent to the President or Chairman of the local body concerned.

66. In the sketches showing alterations required as per decision, the Survey Officer must certify in the sketch that "effect has been given correctly to his decision".

ARRANGEMENT OF LAND COMPLAINT FILE AND FILLING OF CERTAIN PAGES.

67. The L. C. files should be arranged as follows:—

Land Register extracts should be filed between the pages of the Preliminary enquiry surveyor's report and sketch.

(1) Original Petitions.
(2) Head Office reference, if any.
(3) Documents of parties.
(4) Head Office docket.
(5) Sketches and
(6) Summons.

All these should be filed between printed page Nos. 4 and 5. Depositions, findings, decision, A.Rs. if any, correction sketch, and last of all continuation forms, should come in regular succession

thereafter. The pages should be numbered in the above sequence and the complete file then stitched, in the form of a book with cartridge paper cover containing information as follows :—

L. C. No.

Taluk.

District.

Name of S. O.

Date of disposal.

Number of pages.

FILLING OF PAGE OF THE BOOKLET.

68. (*a*) The presence or absence of parties or their representatives should be properly noted in the column concerned.

(*b*) Part I. Nature of complaint should be clearly written showing the survey and sub-division numbers. Complained of a vague term, " incorrect demarcation " is not sufficient.

(*c*) Part II. Should be divided as below and the signature of parties in acknowledgment of receipt back of documents obtained in columns (1) and (2).

Document filed Plaintiff or appellant.	Defendant or respondent.
(1)	(2)

Witness examined.

Plaintiff's or appellant's	Defendant's or respondent's

Note.—The names of parties or their representatives should not be rewritten in the column for witnesses examined. They are not witnesses in the true sense of the term. By combining both names, the answer to question 2 in land complaint continuation form will have to be noted as 'yes' while it is 'no'.

69. Land Complaint continuation forms are to be carefully filled up leaving no room even for minor defects to be pointed out. The additional questionnaire form should also be attached in continuation of the printed questionnaire form.

GENERAL.

70. Files which do not involve any corrections in field should be submitted to Head Office within a week from the date of disposal. Files involving field correction should be sent within a fortnight.

71. The above instruction should be carefully observed in the disposal of land complaints.

72. Files must on no account be sent to the record room after disposal without making sure that all the court fee labels in the files have been punched with the circular punch. On receipt in the record room, the second punching with the diamond punch must invariably be made before the files are kept in the record bundle.

APPENDIX NO. XXVII.

LIST OF RETURNS DUE FROM SURVEY UNITS.

Part I—List of returns due in the office of the Joint Director of Survey and Land records from Survey Unit office, Central Survey Office and Collectorate.

Annual Periodical.

Name of Returns.	Date due in the office of Joint Director of Survey and Land Records.	Due from/to
(1)	(2)	(3)
1 Landed property statement of Gazetted Officers of the Survey and Land Records Department.	10th January of every year.	All Survey Unit Offices.
2 Landed property statement of Upper subordinates of the Survey and Land Records Department.	20th January of every year.	Do.
3 Personal files—maintenance periodical report for the year ending 31st December.	15th February of every year.	Do.
4 Military Army personnel serving under the State Government statistics report.	15th January	Do.
5 Funds—prompt settlement of Provident Fund Account—List of subordinates (Non-Gazetted who are due to retire in the next Financial year.)	Do.	Do.
6 Statement showing the list of Records issued to Board of Revenue during the year and pending with the Board as on **1st January**.	10th January	Deputy Director, of Survey Central Survey Office, Madras.

Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to.
(1)	(2)	(3)
7 Annual Return of Records sent to outside officer and outstanding with them for over 5 years and for which Boards intervention is necessary.	15th January	Deputy Director of Survey, Central Survey Office, Madras.-5
8 Record of maps—Annual Certificate of physical verification—Regarding.	15th October	Do.
9 Maps Restricted Maps issued—Safe custody and periodical destruction annual certificate furnishing of.	5th December	Deputy Director of Survey, Central Survey Office, Madras-5
10 Periodical certificate regarding verification of Security deposits in safe custody.	15th May ..	All Survey Unit Offices.
11 Certificate of Annual check of stores and furniture under Article 143 of Tamil Nadu Financial Code Volume I.	1st April ..	Do.
12 Surprise check of Stores in Government Offices by Superior Offices.	1st June ..	Do.
13 Permanent Advance acknowledgment.	5th April ..	Do.
14 Statement showing the number of Telegrams and Express—Delivery letters sent.	10th April ..	Do.
15 Number statement showing the Pay and Allowances.	15th July ..	Do.
16 Expenditure—Forecast of probable expenditure in England and Europeon Stores.	20th July	Deputy Director of Survey, Central Survey Office, Madras-5.

Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to.
(1)	(2)	(3)
17 Stores and instruments Indents of the District Unit Officers—Review Regarding.	15th July ..	Deputy Director of Survey, Central Survey Office, Madras-5.
18 Indent of Foreign Stores for the ensuing year.	5th October	Do.
19 Annual—Revised estimate for the current year and Budget estimate for the ensuing year based on 4 months actuals and 8 months probable.	1st August ..	All Survey Unit Offices.
20. Revised Estimate for the current year showing additional appropriation required based on 8 months actuals and 4 months probable.	10th December	Do.
21 Final modification proposal showing additional allotment and surrenders.	30th January	All Survey Unit Offices.
22 Particulars of contract entered into the list of firms mentioned in Government Memo. No. 587 BG 163-1, Finance, dated 30th January 1960.	30th October	Deputy Director of Survey, Central Survey Office, Madras-5
23 Annual Certificate of Verification of typewriters, duplicators, etc.	5th April ..	All Survey Unit Offices.
24 Weights and measures adoption of metric system for detailed particulars for the anticipated expenditure in the financial year.	25th April ..	Do.
25 Actual Expenditure for the whole year for adoption of metric weights and measures,	25th July ..	Do.

Name of Returns. (1)	Date due in the Office of Joint Director of Survey and Land Records. (2)	Due from/to. (3)
26 Survey—Frontier Boundary Annual Inspection—Report.	25th May ..	Collectors of Nilgiris, Kanyakumari and Dharmapuri, District Revenue Officers of Thanjavur, Madurai, Coimbatore and Tirunelveli.
27 Number Statement Budget "029LR.—01 (C) Survey and settlement operations" Maintenance of Ryotwari B- Municipal and Union Surveys.	15th July	All Collectors and District Revenue Officers
28 Budget—Budget estimate for the ensuing year and revised estimate for the current year under the Head "029 LR —01 (C) Survey and settlement operations." A. Ryotwari Surveys—B. Municipal and Union Surveys additional allotment required and savings based on 4 months actual and 8 months probable.	1st September	Do.
29 Budget—Budget estimate for the year "029LR01-(C) Survey and settlement-operations". A. Maintenance of Ryotwari Surveys—B.Municipal Union Surveys 8 months actuals and 4 months probables.	10th December	Do.
30 Estimate number of candidates to be appointed to Tamil Nadu Survey and Land Records Service by Transfer.	10th February	All Survey Unit Offices.

Name of Returns.	*Date due in the Office of Joint Director of Survey and Land Records*	*Due from/to.*
(1)	(2)	(3)
31 Annual Certificate for Temporary Advance held by Officers as on 1st April.	15th April	All Survey Unit Offices.
32 Annual Certificate of Debit head balance as on 1st April with each Officer.	15th May ..	All Survey Unit Officers, Collectors and District Revenue Officers.
33 Public Servants—Special and Departmental Tests—Failure to pass by Employees—Relaxation of rules—Annual report.	30th December	All Survey Unit Officers and Deputy Director, Central Survey Office, Madras.
34 Budget—Budget estimate on R.S.A. C.S.M. (B) Survey Officers.	15th November	All Survey Unit Offices.
35 Motor vehicles—Madras Department vehicles Central Rules—Rule 22 submission of annual return of Motor Vehicles as on 1st April.	15th May ..	Do.
36 Public Services—Tamil Nadu Survey and Land Records Department—Watching drawal of panel in respect of the cadre of Inspector of Survey and Land Records.	5th April ..	Do.
37 Public Services—The Tamil Nadu Survey and Land Records Department—Return for watching drawal of panel in respect of the category of Head Surveyor.	5th April ..	All Survey Unit Offices.

Name of Returns. (1)	*Date due in the Office of Joint Director of Survey and Land Records.* (2)	*Due from/to.* (3)
38 Loans and Advances—Advance to Government Servants for the Celebration of Marriage —Demand, collection and balance statement.	7th April ..	Due to Board from Joint Director's Office.
39 Public Service—Tamil Nadu Survey and Land Records Department—return for watching drawal of panel in respect of the category of Senior Computor Draftsman.	5th April ..	All Survey Unit Offices and Deputy Director, Central-Survey Office.
40 Public Services—Tamil Nadu Survey and Land Records Department—Return for watching of drawal of panel in respect of the category of Superintendents.	5th April ..	Do.
41 Loans and Advances—House Building advances sanctioned to Government Servants—Permission to let out the building on rent—Periodical return during the year.	5th May	All Survey unit Offices.
42 Financial Assistance from Government of India. Actual expenditure for the first nine months and anticipated expenditure for the last three months.	5th January	All Survey Unit Offices and Deputy Director, Central Survey Office, Madras.
43 Public Services—Special Representation—Annual return to restriction of appointment year ending 31st March.	25th May ..	All Survey Unit Offices.
44 Loans and advances—House Building advances—Control of expenditure—Periodical prescribed.	5th March ..	Do.

	Name of Returns.	*Date due in the Office of Joint Director of Survey and Land Records*	*Due from/to.*
	(1)	(2)	(3)
45	Typewriters repairs—Bills settlement of—Regarding.	10th March	All Survey Unit Offices and Deputy Director, Central Survey Office, Madras-5.

Half Yearly Periodicals.

1	Official Language—Tamil introduction in Office of Head of Certain Departments and some regional offices-partial scheme of Tamil correspondence proposal of the official Language Committee—Half yearly progress report.	15th January and July.	All Survey Unit Offices.
2	Confidential reports on probationers in the Survey and Land Records Service.	10th March and September.	Board of Revenue
3	Scootor (Distribution and Sale) Control order—1960—Allotment of Scooters by Government from out of Quota—Improper utilisation and unauthorised sale—Half yearly return.	31st May and 30th November.	D.O.S.,&S Madras 9th January and 9th July
4	List of appeals with held (Nil return not to be sent).	15th January and July.	All Survey Unit Offices.
5	Public Services—Non-permanent Government Servants—Discharged for suspected or proved corruption-report.	15th January and July.	All Survey Unit Offices.

Name of Returns. (1)	*Date due in the Office of Joint Director of Survey and Land Records.* (2)	*Due from/to.* (3)
6 Pension—Superannuation Statements—List of Gazetted Officers who are due to retire on superannuation in 12 to 18 months—Half-yearly returns.	15th January and July.	Board of Revenue
7 Pension—Superannuation statements—List of Non-Gazetted Government Servants who are due to retire on superannuation 12 to 18 months—Half-yearly returns.	5th January and July.	All Survey Unit Offices.
8 Return of Boundary dispute—Half-yearly reports for the period ending 30th June and 31st December.	17th January and July.	Do.
9 Foreign Exchange—Budget requirements for the half-year ending 30th June and 31st December.	5th February and August.	Deputy Director, Central Survey Office, Madras-5.
10 Half-yearly return showing direct purchase from firms amounting Rs. 2,000 and above—in each case for the half-year ending September and March.	26th June and December.	Do.
11 Periodical Adjustments—Bills and cash bills sent for acceptance and settlement pending over 6 months for acceptance and adoption with outside officers and Accountant General, Madras.	1st January and July.	Do.

Name of Returns.	*Date due in the Office of Joint Director of Survey and Land Records.*	*Due from/to.*
(1)	(2)	(3)
12 Deputation of officers of Tamil Nadu Government to other Government Private Bodies, etc.,—Recovery at contribution-instructions—details of deputation for the half-year ending 31st March and 30th September.	10th April and October.	All Survey Unit Offices.
13 Survey—Estate Survey-working out of cost rates and demand statements sent to Collector during the half-year ending 31st March and 30th September.	15th May and November.	Do.
14 Survey Advance—R.S.A.—Half yearly report on the survey Advance for the peroid ending 31st March and 30th September.	30th April and October.	All Survey Unit Offices and District Revenue Officers.
15 Office procedure—Progress of Business in the Offices—submission of half-yearly return in the prescribed proforma for half year ending 30th June and 31st December.	10th January and July.	All Survey Unit Offices.
16 Statement showing actual expenditure on adopting Metric system during the half-year ending 31st March and 30th September.	7th April and 7th October.	All Survey Unit Officers and Deputy Director, Central Survey Office, Madras.

Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to
(1)	(2)	(3)
	Quarterly Periodicals.	
1 Public Services—Corruption cases detection-report.	20th January April, July, and October.	All Survey Unit Offices.
2 Public Services—Tamil Nadu Survey and Land Records Services– Temporary Appointment made to the post of peon and Attender under emergency provisions.	15th January April, July and October.	Do.
3 Pension—Expeditious—Disposed of Pension cases—progress reports quarterly.	Do.	Do.
4 Statement showing the progress of work completed on the drawing printing and supply of maps for the quarter ending March, June, September and December.	21st January April, July, and October.	Deputy Director, Central Survey Office, Madras.
5 Foreign Exchange Commitment out standing at the end of each quarter.	7th January April, July, and October.	Do.
6 Quarterly return showing payment made in respect of advertisement Charges incurred in the quarter.	5th January April, July and October.	All Survey Unit Offices.
7 Periodical quarterly audit objection prompt disposal regarding B. P. Rt. 271–64, dated 20th April 1964.	1st January April, July and October.	All Survey Unit Offices.

Name of Returns.	*Date due in the Office of Joint Director of Survey and Land Records.*	*Due from/to.*
(1)	(2)	(3)
8 Small Savings Scheme—Intensification of Pay roll saving scheme—Quarterly report	10th January, April, July and October.	All Survey Unit Offices and Deputy Director, Central Survey Office, Madras.
9 Revenue Records Registration—Maintenance of Survey Records—Progress of work done by Karnams and Maintenance Field Surveyors—Quarterly reports.	20th January, April, July, and October.	All Collectors and District Revenue Officers.
10 Establishment—Temporary sanction for continuance avoidance of delays—Quarterly periodical prescribed for each quarter.	10th January, April, July, and October.	All Survey Unit Offices.
11 Motor Vehicles—Madras Departmental Vehicles Control Rules—Checking of extravagant use of departmental Jeeps.	20th January, July, and October	Do.
12 Quarterly return of Inspection of field work.	17th January, April, July and October.	Do.
13 Public Services—Declaration of probation—Avoidance of delay.	5th January, April, July and October.	Do.
14 Copies of the reviews of diaries of Assistant Director of Survey and Land Records and Works Manager and Deputy Director of Survey, Central Survey Office, Madras-5.	25th January, April, July and October.	All Survey Unit Offices, Deputy Director of Survey, C. S. O. Madras and WorksManager

	Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to.
	(1)	(2)	(3)
15	Periodical statement of unserviceable articles disposed of in the District Survey Unit Offices during each quarter.	10th January, April, July and October.	Deputy Director, C. S. O. Madras-5.
16	Tour–Tour of the Assistant Director of Survey and Land Records—Submission of quarterly periodical report regarding the places visited, inspection and other works done.	10th January, April, July and October.	All Survey Unit Offices.
17	Public Services—Regular selection of appointments—Avoidance of delay—Return for every quarter.	5th January, April, July, and October.	All Survey Unit Offices and Deputy Director, C.S.O., Madras.
18	Public Servants—Suspension pending enquiry—Review of cases after six months—Return for every quarter.	5th January, April, July and October.	All Survey Unit Offices.
19	Electricity—Supply to Government Department—Belated payment surcharge—Treasury audit on contingent bills—Report on cases of belated payment, etc., by subordinate officers to Heads of Departments.	5th January, April, July and October.	All Survey Unit Offices and Deputy Director, C.S.O., Madras.
20	Statistical return statement for the quarter ending from all the District Unit Officers—Consolidated report from the Deputy Director, C.S.O., Madras-5.	15th January, April, July and October.	Deputy Director, C.S.O., Madras.
21	Administration Report on Survey and Maintenance of Revenue Records and Registration.	5th January, April, July and October.	All Survey Unit Offices, and Deputy Director, Central Survey Office, Madras-5.

Name of Returns. (1)	*Date due in the Office of Joint Director of Survey and Land Records.* (2)	*Due from/to.* (3)
22 Stores—Direct purchases made from firms and not through D. G. S. and D.	1st January, April, July and October.	Deputy Director, Central Survey Office, Madras,
23 Telephones—Provided at the residences of officers holding temporary posts—Disconnection of.	Do.	All the Survey Unit, Offices.
24 Scooters—(Distribution and Sale) Control Order, 1960–Allotment of Scooters by Government from out of State Government Quota—Improper utilisation and unauthorised sale—Instructions—Issued.	Q.E.28th Feb. ,, 31st May ,, 31st Aug. ,, 30th Nov.	All District Unit Offices. Due 15th March ,, 15th June ,, 15th Sep. ,, 15th Dec.
25 Khadi—Sale of Khadi in r/o State Government on credit basis-Avoidance of delay in the commencement succeeding the month of recovery of Khadi advance from the Pay of the Government Servants—Quarterly returns—Prescribed.	10th of every succeeding month of a quarter.	All District Unit Offices and Deputy Director, C.S.O., Madras-5.
26 Quarterly return showing the details of vacancies that occurred and notified to the Employment Exchange during the quarter ended March, June, September and December.	5th of each succeeding quarter.	All District Unit Offices and Deputy Director, C.S.O., Madras. [Due to Board (SE) through D.O.S.&S. 15th of succeeding each quarter].

Name of Returns.	*Date due in the Office of Joint Director of Survey and Land Records.*	*Due from/to.*
(1)	(2)	(3)
	Monthly Periodicals.	
1 Survey—Regular items of Survey work—Monthly progress report.	1st of every month.	All Survey Unit, Offices.
2 Survey—Resurvey monthly progress report.	Do.	Do.
3 Survey—Maintenance—Mobile and adhoc items of work—Monthly efficiency statement.	Last date of the month.	All Survey Unit, Offices.
4 Survey—Resurvey Field Inspections by the different grades of Inspecting officials—arrears statement.	15th of every month.	Do.
5 Pension—Delay in finalisation of pension cases—Extract from Special Register—Monthly return.	10th of every month.	All Survey Unit Offices.
6 Survey — General Re-survay of the State under metric system —Progress of resurvey operation.	7th of every month.	Do.
7 Statement showing the progress of Survey (Revenue follow up) after settlement fieldwork during the month.	10th of every month.	Do.
8 Statement showing the progress of survey (Revenue follow up) after settlement fieldwork during the month.	15th of every month.	All Survey Unit Offices.
9 Survey—Survey of Inam Estates Minor Inam, etc., under the Act, 1963—Progress statement report—Regarding.	15th of every month.	Do.

Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to.
(1)	(2)	(3)
10 Extract from the disbursing Officers Regarding.	20th of every month.	All Survey Unit Offices.
11 Expenditure Return,—Locality-war.	25th of every month.	Do.
12 Budget—Control of expenditure 9, L R—'C', Land Records 'A', Maintenance of Ryotwari Surveys.	25th of every month.	All the Collectors/District Revenue Officers.
13 Budget—control of expenditure 9. Land Record C. Land Record B. Maintenance of Municipal and Union Surveys.	25th of every month.	Do.
14 Budget—Control of expenditure, 71. Miscellaneous demarcation of frontier boundary,—monthly return.	25th of every month.	All the Collectors and District Revenue Officers.
15 Statement showing the number of vacancies and appointment made in the category of field surveyors and Computor—Draftsmen in the District Unit Offices and Deputy Director, C. S. O., Madras.	10th of every month.	All the Survey Unit Offices.
16 Statement showing the D.C.B. in respect of collection of ryot share of survey charges.	10th of succeeding month.	All the Collectors and District Revenue Officers.
17 Advance—R.S.A., C.S.M. (B) Survey Officers—Transaction during the month.	25th of every month.	All Survey Unit Offices/District Revenue Officers.
18 Periodical—Report showing the proper usage of Theodolite in the Unit Offices.	10th of every month.	All Survey Unit Offices.

	Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to.
	(1)	(2)	(3)
19	Motor Vehicles, Jeep, Return, extract of log book, minutes consumption of petrol—Maintenance report, etc.	5th of every month.	All Survey Unit Offices.
20	Advances R.S.A. C.S. M. (F) Collections-transaction during the month.	25th of every month.	All the Collectors/District Revenue Officers.
21	Monthly report on the progress of survey operation from the survey units.	15th of every succeeding month.	All Survey Unit Officers and Deputy Director, C.S.O., Madras.
22	Statement of progress made in finalling and printing of village maps in Map drawing Office pertaining to the estimatedvillages for the month.	15th of every month.	Deputy Director, Central Survey Office, Madras-5.
23	Motor vehicles—Traffic violations in Madras City—Detection and report by Gazetted Officers monthly return to be sent to Board.	5th of every month.	All Survey Unit, Offices and Deputy Director of Survey, Central Survey Office, Madras-5
24	Maps—Election Maps—Monthly sales—Particulars submitted to Government—Monthly return.	1st of every month.	Deputy Director, Central Survey Office, Madras-5.
25	Diaries of Assistant Director of Survey and Land Records and Deputy Director, C. S. O., and Works Manager Madras, 5.	5th of every month.	All Survey Unit Officers and Deputy Director, C. S. O., Madras and WorksManager.

Name of Returns.	Date due in the Office of Joint Director of Survey and Land Records.	Due from/to.
(1)	(2)	(3)
26 G. P. F. — delayed submission of application and nomination to join the G.P.F. after completing one year service—report.	5th of every month.	All Survey Unit Officers and Deputy Director of Survey, C.S.O., Madras.5
27 Family planning--Marriage loan scheme-list of persons drawing the advance-particulars.	5th of every month.	Deputy Director of Survey, Central Survey Office Madras-5.
28 Transfer of Registry-Applications for transfer-work done by the regular Revenue staff-Speedy disposal—particulars.	15th of every month.	All Survey Unit Offices.
29 Handloom Industry-sale of Handloom cloth to Government servants on credit basis-Reconciliation of debits and credits—Monthly statement.	15th of every month.	All Survey Unit Offices and Deputy Director, C. S. O., Madras.
30 Advances—R.S.A., C.S.M. (B) Survey Officers working out of cost of rates and publication of survey notification-monthly Periodical report.	5th of every month.	All Survey Unit Offices.
31 Revenue Records & Registration-Taluk Office-inspection done by the Assistant Director of Survey and Land Records—Progress report.	10th of every succeeding month.	Do.
32 Loans and Advances—Advances for Building purposes—sanction to the Staff of Survey and Land Records Department—Monthly recovery—particulars.	5th of every month.	All District Unit Offices and Deputy Director of Survey and Land Records, C.S.O., Madras-5.

Name of Returns. (1)	Date due in the Office of Joint Director of Survey and Land Records. (2)	Due from/to. (3)
33 Advances—R.S.A.—C.S.M. (A) Credit, Debit and balance-Statement-Monthly return.	10th of succeeding month.	All District Unit Offices and Collectors.
34 Forests—Kanyakumari District Refixation of boundaries—between forest and private areas-Joint inspection with Forest Officials—Progress report.	20th of each month.	Assistant Director of Survey and Land Records, Nagercoil.

Fortnightly Periodicals.

1 Statement showing the Demand Collection and Balance in respect of Ryotwari share of Survey charges in Kanyakumari District.	5th and 20th of every month.	Collector, Kanyakumari.
2 Survey—Resurvey—Progress in preliminary investigation work —Fortnightly statement.	3rd and 18th of every month.	All Survey Unit offices.
3 Statement showing the particulars of receipt of A1 to A3 Memo records and supply of Supplemental Survey records.	10th and 25th of every month.	All Survey Unit Offices.
4 Survey—Resurvey-Madurai District, Kodaikanal Taluk—Assignment work—Progress of work and supply of records to Special Deputy Collector.	5th and 20th of each month.	Assistant Director of Survey and Land Records, Madurai.

Name of Returns.	*Date due in the Office of Joint Director of Survey and Land Records.*	*Due from/to.*
(1)	(2)	(3)
5 Records verification and re-arrangement of records in the the Central Survey Office, Madras-5. Fortnightly progess statement Review.	5th and 20th each month	Assistant Director of Survey and Land Records (Re-arrangements of Records) Central Survey Office, Madrsa-5
6 Housing - Accommodation-Officers who have their own houses in place of duty but are occupying Government Quarters—Progress Report-Fortnightly report.	5th and 20th each month.	All Survey Unit Offices and Deputy Director, Central Survey Office, Madras.

APPENDIX XXVIII.

ANNUAL OFFICE INSPECTION OF THE OFFICE OF THE ASSISTANT DIRECTOR OF SURVEY AND LAND RECORDS (DISTRICT SURVEY UNIT) BY THE JOINT DIRECTOR OF SURVEY AND LAND RECORDS, CHEPAUK, MADRAS-5.

PRESENT:

1. Date of inspection

2. Date of last inspection

3. Names of Officers and periods during which they were incharge.

INTRODUCTORY:

Part I (To be in Tamil)

1. *Appointment.*—Does the office maintain a watch on the prompt preparation of list of approved candidates for Assistants?

Note.— This question will be answered in respect of the categories for which the Head of the Office inspected is the appointing authority.

2. Examine a few files or disposals relating to the preparation of such lists and answer the following questions.

(*a*) Has the schedule of dates prescribed been adhered to?

(*b*) Are adequate number of candidates selected by the competent authorities?

(*c*) Are such candidates selected by the competent authorities being appointed regularly even in the first instance?

(*d*) Are temporary appointments made only when candidates selected by the competent authorities are not available?

(*e*) Have persons with more than 3 years temporary service been allowed to draw the first increments in the 4th year?

3. *Maintenance Of Service Registers.*—(*a*) Are service registers maintained for the personnel in accordance with the instructions in the Fundamental rules?

(*b*) State (i) the total number of persons for whom service registers are to be maintained.

(ii) The total number of persons for whom service registers are actually maintained.

(iii) The reasons for not opening service registers for others.

(iv) The total number of cases where certificates of verification of service have not been furnished.

(v) The steps taken to issue the certificate in respect of cases in item (iv) above

(vi) The number of cases where sanction of increments is delayed and action taken to ensure that such delays did not recur.

(vii) Has the quinquennial verification of the entries in the registers been caused to be made by all the members of the office and their signatures obtained in the register in token thereof?

(*c*) (*i*) Is the leave account posted up to date in all cases?

(ii) Have the landed property statements been obtained and filed.

4. *Maintenance Of Personal Files.*—(*a*) Are personal files for all Government servants concerned maintained properly and upto date?

(*b*) State the number of cases where the entries, files are not up to date.

(*c*) Have adverse remarks, if any, been communicated to the Government Servants concerned and their acknowledgments filed, in the personal files?

(*d*) State the number of cases where adverse remarks were not communicated (excluding cases where the scrutinising authority has specifically ordered the with holding of communications of adverse remarks).

(*e*) Are defaulter sheets maintained for Last Grade Government Servants?

5. *Declaration of Probation.*—(*a*) Is a register of probationers maintained up to date separately for each category of Government Servants?

(*b*) Has it been examined every month and action initiated well in advance in all cases due for declaration of the completion of probation?

(*c*) Have probation sheets been opened for all persons regularly appointed?

(*d*) Are there any delays in passing orders of completion of probation?

6. *Registers of Substantive Appointment.*—(*a*) Is a register of substantive appointment maintained up-to-date?

(*b*) Has it been examined every month by the Head of office or other competent authority?

(*c*) Are there any delays in making substantive appointments?

(*d*) Is intimation being sent to other appointing authorities promptly whenever any substantive vacancy which that authority is competent to fillin becomes available, by the confirmation ordered?

7. *Pensions.*—(*a*) Did any one in the office inspected retire from service during the period under Inspection?

(*b*) Is the Head of the Office inspected competent to sanction the pension? if so:

(i) Was action initiated in time for the sanction of pension? If not, the reason for the delay must be stated.

(ii) Was pension sanctioned in time?

(iii) In case where delay in sanction of pension could not be avoided, was anticipatory pension sanctioned?

8. *Suspension.*—(*a*) Was any one placed under suspension by the head of the office inspected? If so, indicate in each case the date of issue of charge memorandum and the present state of the proceedings.

(*b*) Was the suspension necessary in the public interest?

(*c*) Are steps being taken to conclude expeditiously the disciplinary proceedings against persons under suspension?

(*d*) Was subsistence allowance paid to the incumbent and was a review of the rate of subsistance allowance made as required under rule 63 of the Fundamental Rules?

9. Rectification of defects and omission. How far have the defects and omissions pointed out by the inspecting staff been rectified before the inspecting officers' personal inspection.

10. General remarks (These should include remarks on the extent of personal interest taken by the Heads of the office).

11. What is the sanctioned staff employed on the date of inspection?

12. *Office Order.*—Is the file of office orders regarding the organisation, distribution of work and disposal of correspondence kept separately and indexed properly?

13. *Distribution Of Work.*—Prepare statement showing the division of the Office into sections and the subjects dealt with in each section in general and the subject allotted to each Clerk.

14. *Tapals.*—(*a*) Are the Tapals being opened in the presence of the Assistant Director of Survey and Land Records whenever he is at Headquarters?

(*b*) What arrangements have been made for the opening and distribution of tapals during his absence from headquarters?

15. *Distribution Registers*—(*a*) Have all the tapals been duly accounted for in the distribution register and the initials of the concerned subject clerks taken in acknowledgment thereof?

(*b*) Has the Officer opening the tapals initialled in the register after each batch for entries made in it?

(*c*) In the case of numbers assigned to papers which are only replies to references on pending currents, have they been ringed off with the respective personal register current number noted against each.

(*d*) Has the despatch seal been affixed in the last column of the register in respect of all "N" Disposals?

(*e*) (i) Have all the numbers assigned in the Distribution Register been regularly brought to the personal registers of the concerned subject clerks then and there?

(ii) Has this fact been checked at regular intervals by the section-heads by a comparison of the Personal registers with the Distribution Register and have discrepancies between these two registers, if any, been reconciled.

(*f*) (i) Have all the files disposed of been handed over to Record-Keeper regularly and his dated initials obtained in the last columns of the register in token thereof ?

(ii) Have any undue delays been noticed in the handing over of the disposed of files to the Record-Keeper and are there instances where the Record-Keeper's initials are wanting ? (List out such cases).

16 Is the special Register maintained by the Superintendent to watch the receipt and speedy disposal of important and urgent references including reminders from superior Officers ?

17. *Security Registers.*—(*a*) Is the Register maintained in the prescribed form ?

(*b*) Have all the entries made in this register been attested by the head of the Office ? (Head of the Office means the Officer opening the tapals).

(*c*) Have all the valuables entered in the Register been accounted for and an indication of their final disposal given in the remarks column ?

18. *Disposal of Business and Check of Delays.*—Prepare a statement showing the progress in the disposal of business according to the half yearly business returns for the previous 3 half years and for the current half year up to the date of inspection and comment on the steps taken or to be taken to reduce the pendency.

19. *Arrear list.*—(*a*) Are the abstract and detailed arrear lists prepared and maintained in the prescribed form ?

(*b*) Are the lists compared monthly with the distribution register and discrepancies reconciled and has a certficate to that effect been appended in the consolidated arrear list ?

(*c*) Have the arrear lists together with the consolidated arrear list been submitted to the Assistant Director of Survey and Land Records, punctually on the 10th of each month.

(*d*) Do the detailed arrear lists bear indication that the entries are being regularly scrutinised in detail by the section heads, the Superintendent and Assistant Director of Survey and Land Records with a view to checking delays ?

(*e*) Have the arrear lists of previous year been handed over to the Record-Keeper in January and his acknowledgment obtained in the current Registers ?

20. *Maintenance of Records and Connected Registers.*—Is the record room in good repair? Is it watertight, protected from white ants, kept clean and secure from entry at all points? Is it lighted sufficiently?

21. (i) Have all the disposed of bundles been neatly tied up and deposited vertically on the record racks?

(ii) Are there any files containing adhesive court fee lables which have not been punched with the diamond hole in addition to the circular hole already made by the subject Clerks?

22. Are the rack registers kept and indexed boards displayed in each rack to show its contents?

23. *Record Issue Register.*—(i) Is it maintained in the prescribed form?

(ii) Are requisitions made on proper printed slips and has any record been issued without first being entered in the registers?

24. Has the register been checked systematically and adequately?

25. Have the entries in this Register been verified once a month with reference to the current numbers for which they were taken?

26. *Record Arrear list.*—Is the list prepared every month to show the disposal file taken out from the records but not returned for a period of three months? Has a list together with the reconciliation reports of the clerks been submitted to the Assistant Director of Survey and Land Records on the 10th of each month regularly? Have adequate and effective steps been taken for the restoration of the files to the record room?

27. *Record Key Register.*—Is the register maintained properly and in the prescribed form?

28. Has the register been opened for the current year and have the old registers been destroyed after retention for a period of one year.

29. Has the register been checked regularly and has the check been adequate?

30. *Index.*—Is the alphabetical index of R and D disposals compiled annually?

31. *Destruction of Records.—(a)* Is the list of files ripe for destruction prepared and got approved by the Assistant Director of Survey and Land Records, and have the files been destroyed ?

(*b*) Has the Superintendent appended the certificate at the foot of the list that all the files ordered to be destroyed, have been destroyed ?

(*c*) Have the destruction lists been carefully filed and preserved in the record room in a separate bundle ?

32. *Tamil Nadu Government Gazette.*—(*a*) Are the gazettes kept neatly arranged ? Are the Acts in English and in the regional language regularly filed ?

(*b*) Are the files of the District Gazettes Complete ?

(*c*) Have the Tamil Nadu Government Gazettes and the District Gazettes been stitched and bound in separate parts ?

33. *Stationery and Forms.*—Have the stationery articles and forms been neatly stocked and valuable articles kept under lock and key ?

34. *Stationery Issue Register.—(a)* Is the register maintained in the prescribed form ?

(*b*) Has the quarterly verification and stock taking been done by the Assistant Director of Survey and with what results ?

35. Are the Stock books of stores and stationery regularly checked by the Assistant Director of Survey or the Superintendent and is the stock verified and certificate appended ?

36. Have recoveries been made for all articles lost or damaged through neglect ?

37. Is a register for disposal of condemned articles maintained ?

38. Typewriter and Duplicator Machine Cards : Is the machine card maintained properly and in the prescribed form ?

39. *Books..—(a)* Have all the Books received been entered in the register maintained for the purposes ?

(*b*) Is the register maintained to show the issue of books from the library ? Has it been maintained properly and upto date ?

40. Have copies of the District Office Manual been issued to all the Clerks and have they been maintained upto date?

41. *Correction Slips.*—Have all correction slips been pasted in the books to which they belong within three days of their receipt in office?

42. (*a*) Has a list of record files been compiled by the Assistant Director of Survey and Land Records and supplied to each Clerk?

(*b*) Have such files been properly maintained in the record room according to their file numbers and arranged chronologically?

43. Are the special registers connected with the maintenance of Jeep maintained?

(*a*) Log Book, Part I.

(*b*) Log Book, Part II.

(*c*) Petrol register.

44. *Furniture.*—Is the Register maintained and all the articles entered in it, assigning inventory numbers? Has it been checked periodically and adequately?

45. *Maintenance of Personal Registers, Periodical Registers, etc.*—Has a programme for check of these registers by the Section heads, Superintendent and the Assistant Director of Survey and Land Records been drawn up in advance and is a copy of this available with every clerk? Has the due date for the check of the personal Registers been noted in the first page of each clerk's register?

46. Have the Registers been checked regularly and effectively on the due dates by the Section-heads, Superintendent and by the Assistant Director of Survey and Land Records and is prompt action being generally taken for the rectification of the defects pointed out by the checking officers?

47. *Maintenance of Personal Register.*—Have the registers been maintained properly and neatly with a run-on file?

48. Have all the current numbers of the previous year remaining undisposed on the first of April been brought forward to the first volume of the current personal Register sufficient number of pages having been set apart in the beginning of the Register for the purpose?

49. Have all the papers received and acknowledged in the Distribution Register been duly and properly accounted for?

50. Have any undue delays been noticed either in taking initial action on currents or submitting draft for orders ?

51. *Periodical Registers.*—Has a consolidated periodical register been maintained and have all the returns prescribed been duly accounted for in the individual periodical registers maintained by the subject clerks ?

52. Have the individual periodical registers been maintained properly ?

(*a*) Have any undue delays been noticed in the despatch of the out going returns ? (List out such cases)

(b) Verify the entries made in the register with reference to a few filed periodical returns and note the result ?

53. Have the disposed of current files and the periodical returns been properly handed over to the Fair copy section and Record Keeper and their acknowledgments taken in the personal Registers and periodical register respectively ?

54. Have the run on files of the previous year been withdrawn from the clerks in January of each year and kept in the Record ?

55. Have the Personal Registers of the previous years been handed over to the record keeper in April and his acknowledgment obtained there for in the current register ?

56. *Fair Copying Register.*—(*a*) Is the register maintained properly in the prescribed form ?

(*b*) Has it been checked regularly and adequately ?

(*c*) Have any undue delays been noticed in the fair copying and despatch ?

(*d*) Compare the date of despatch stamp on a few drafts with the entries made in the register and note the result.

57. *Despatch Register.*—(*a*) Is the register maintained properly ?

(*b*) Is the Local Delivery Book maintained separately ?

58. *Stamp Accounts.*—(*a*) Is the register maintained in the prescribed form ? Has it been checked systematically and adequately ?

(*b*) Has economy been observed in the expenditure on service Postage ?

59. *Register showing expenditure on Telegrams and Telephone.*—(*a*) Are the registers maintained in the prescribed forms ?

(*b*) Have prior orders of the Assistant Director of Survey and Land Records, been obtained for the issue of telegrams and has either classification as " Ordinary " and " Express " been judiciously made ?

(*c*) Is the issue of the telegrams and Trunk Telephone calls due to avoidable causes such as failure to issue reminders or take action in proper time or any other neglect or dilatoriness ? Has action been taken to punish or to recover the cost of the telegram from the person responsible ?

60. *Attendance Register.*—Is it maintained in the prescribed form ?

(*a*) Is the attendance regular and do the entries appear to have been made bonafide at the time ?

(*b*) Is the register checked and initialled daily by the Superintendent and by the Assistant Director of Survey and Land Records on the first of each month and or whenever he is at Headquarters ?

(*c*) Is an abstract put up daily to show the number on rolls, number present, number on leave, etc ?

(*d*) Has action been taken promptly each month as laid down in para 4 of the District Office Manual to check late attendance ?

61. *Turn list.*—What arrangements have been made to carry on with the urgent work during holidays ? Has a turn list been maintained ?

62. *Register of Casual Leave.*—(*a*) Is it maintained properly ?

(*b*) Have extracts from the register been promptly sent to other offices concerned soon after the persons have been transferred from the office of the Assistant Director of Survey and Land Records?

(*c*) Compare the entries in the register with entries of leave made in the attendance register and note the result.

63. *Copy application Register.*—(*a*) Is the register maintained in the prescribed form and have the entries in the several columns been made properly and regularly ?

(*b*) Has it been checked regularly and adequately ?

(*c*) Has any undue delay been noticed in granting copies ?

(*d*) Are the stamps and fees collected in cash, correctly accounted for ?

(*e*) Are court-fee stamps attached to petitions duly punched and are undelivered copy stamps (used or unused) sent to the Treasury for cancellation ?

64. *Register of Buildings.*—Is it maintained in the prescribed form ?

65. *Stock files and Index files.*—(*a*) Have the stock files been composed intelligently and maintained properly and up to date ?

(*b*) Have table of contents been put up in the front page of each file.

(*c*) Have they been checked periodically and maintained regularly ?

(*d*) Are the alphabetical index files been composed and maintained year-war in each seat ?

66. *Call Book.*—(*a*) Is the register maintained in the prescribed form ?

(*b*) Has proper use been made of it ?

(*c*) Have any currents been improperly closed by taking them to the register ?

(*d*) Has it been systematically and adequately checked ?

67. *Confidential papers.*—Has the Assistant Director of Survey and Land Records been keeping all strictly confidential papers in his own custody and the Head Ministerial Officer keeping all other files marked confidential ?

68. *Confidential sheets and conduct Register.*—Has the instruction contained in paragraph 199 and 139-A of the District Office Manual been carefully followed by the Assistant Director of Survey and Land Records in the maintenance of the confidential sheets ?

NOTE.—According to the sub-paragraph 3 under the head method of maintenance the in D. O. M. the Inspecting Officers have to scrutinise the confidential sheets to ensure that they are maintained correctly and regularly,

69. *Precautions against fire.*—(*a*) Have adequate precautions been taken against fire to provide fire buckets and fire extinguishers in the office building ?

(*b*) Is the provision of the fire appliances in accordance with the scale prescribed?

(Paragraph 2 of Chapter 1 of Appendix (e) of the D.O.M.)

(*c*) Has the register of fire extinguishers and fire buckets been maintained? Verify the stock with book balance and note the result.

70. *Fire Drill.*—(*a*) Has a register been maintained to show issue of refills for the chemical fire extinguishers after each practice fire fight?

(*b*) Has the register been checked by the Assistant Director of Survey and Land Records soon after the fire drill and has action been taken promptly to set right any defects noticed with any other appliances?

71. *Inspection of Subordinate Offices and Taluk Offices.*—(*a*) Has the Assistant Director of Survey and Land Records, completed the inspection of the subordinate offices for the current year and the Land Records branch of the Taluk Offices in his jurisdiction?

(*b*) Have the defects noticed at the previous inspection been set right or if they have been neglected, what action has been taken to set them right and to deal with the persons responsible for such neglect?

72. *Disciplinary Cases.*—(*a*) Prepare a list of cases in which the Assistant Director of Survey and Land Records has taken disciplinary action and examine whether orders passed were just and proper?

(*b*) Have the prescribed formalities been observed before orders were passed by the Assistant Director of Survey and Land Records?

(*c*) Have any orders been taken up on appeal, and, if so with what result?

73. *Tents.*—(*a*) Have the tents and accessories supplied to the Assistant Director of Survey and Land Records been maintained carefully and properly?

(*b*) Is the register of tents maintained in the prescribed form?

(*c*) Have the tents been periodically exposed to sun and air to avoid decay and have such exposures been recorded in the tents register?

NOTE.—The Inspecting Officer may inspect the tents and note on their condition.

74. *Pay Roll Savings Scheme.*—(i) Whether the pay roll savings scheme has been introduced with reference to G.O. Ms. No. 1505, Finance, dated 15th December 1961?

(ii) Whether all the members of the staff have been enrolled?

(Particulars to be furnished in the following pro forma).

Pro Forma.

(*a*) Number of persons working in the Office.

(*b*) (1) Persons who have enrolled themselves.

(2) Upto the month of

(*c*) Number still remaining to be enrolled.

(iii) Whether a savings committee composed of all members of staff has been formed ; and

(iv) Whether authorisation Form No. 1 has been obtained from employees for the deduction of the amounts in the savings securities ?

(v) Whether the control register in Form No. II as prescribed in G.O. Ms. No. 1505, Finance, dated 15th December 1961 is maintained properly ?

(vi) Whether monthly collections are deposited in Post Office without delay (This can be ensured by checking the control registers once in a month) and whether the check of the control register, is effectively made by the Officer ?

(vii) Whether proper acknowledgments are obtained in respect of employees transferred or leaving services and relevant entries made in the control registers ?

(viii) Whether pass books are kept in safe custody taking due precautions ?

(ix) Whether the control register is maintained separately ?

(x) Whether deductions are brought into the cash Book ?

(xi) Whether commission is claimed promptly and properly with reference to G.O. Ms. No. 956, Finance, dated 17th August 1962 ?

75. *Administration report*.—Have all the quarterly and annual administration reports been properly prepared and sent in time and the files kept properly ?

76. (1) Is the progress of implementation of Tamil Language adequate ?

(2) When the Special Officer or Inspector of the Tamil Nadu Official Language Committee, inspected the office ? What are his special remarks ? Has follow-up action been taken in pursuance of his remarks ?

77. *General remarks of the Inspecting Officer.*—(a) Control of the Assistant Director of Survey and Land Records over his own subordinate officers.

(*b*) The amount of personal contribution by the Officer in writing reports himself on important subjects and progress of work in field and in office.

PART II (In English)

Cash Accounts and Connected Registers.

1. (*a*) Is a cash book maintained in the prescribed form?

(*b*) Is the cash room safe and the system of keeping cash in conformity with the Treasury rules of procedure?

(*c*) Is there any tendency to allow heavy balance in the Office Cash chest above the prescribed limit of Rs. 300?

(*d*) Is the cash balance checked by the Assistant Director of Survey and Land Records or the Superintendent and all entries in the Cash Book are verified with the subsidiary registers and vouchers duly attested?

2. Have proper security deposits been obtained from the store-keeper, the Head Accountant, Cashier and the Stone contractors and the concerned documents safely lodged in the cash chest?

3. Is a register maintained showing such security deposits or deeds and are these checked periodically by the Assistant Director?

4. (*a*) What is the amount of permanent advances sanctioned to the Assistant Director.?

(*b*) Is the register maintained in the prescribed form?

(*c*) Verify the cash on hand and the value of unrecouped vouchers to see if both put together agree with the amount of the permanent advance sanctioned?

(*d*) Has the permanent advance been recouped systematically and monthly or even at shorter intervals, so that it is not allowed to sink too low to meet with any unforeseen expenditure at any time?

(*e*) Have any amounts been sanctioned in subordinate officers and if so have their acknowledgments been obtained in time and filed?

(*f*) Are the advances with the camp clerks of the Assistant Director and the Additional Officer properly accounted for an returns from Camp?

5. *(a)* Are chalans for payments into the treasury, money order receipts and printed receipts filed in the regular order with corresponding cash book numbers noted on them?

(b) Are all miscellaneous cash receipts duly accounted for in the register of miscellaneous payments and balance refunded into the treasury regularly once a month or often, if need be?

6. Are acquittance rolls properly verified before closing and are stamps affixed for all payments of over Rs. 20? Are there delays in the return of acquittance rolls with undisbursed salaries?

7. When contingent bills drawn are all the vouchers duly numbered and cancelled after entry in the register by the checking officer, so that they cannot be used again.

8. Have articles of furniture sundry stores, etc., purchased locally from the contingent grant been receipted in the stock book of stores, and are the dates and pages of the registers entered on the vouchers concerned before passing?

9. *(a)* Is the register of undisbursed pay maintained?

(b) Are undisbursed salaries and travelling and measurement allowances refunded by short drawal in the next bill?

10. *(a)* Has a register been maintained for drawing the Travelling Allowance of the members of the staff?

(b) Has there been any undue delay in the drawal and disbursement of the Travelling Allowance?

11. *(a)* Is the register showing the bills taken to the treasury maintained properly?

(b) Is a list of bills, cashed maintained regularly by the Assistant Director|Superintendent and are all receipts verified within the entries in cash books periodically?

12. Is any amount not required for immediate payment drawn either from general funds or from the temporary advance at any time?

13. Is any advance (O.B.A., Pay, C.B.A.|T.A., Tour Advance) pending recovery over three months? What is the duration of the longest pending Advance?

14. Has any amount been drawn from the temporary advance to meet any contingent charges or for any other purpose unconnected with charges for boundary pillars and hired labour in Government tracts and Towns ?

15. Is a fair percentage of items in the outturn statements and diaries on which pay and measurement allowance have been passed by the Assistant Director of Survey and Land Records checked with rough pay and cooly bills ? Is a similar comparison made of such check recorded in the rough pay and cooly bills ?

16. Are supplemental drawals of salaries, travelling and measurement allowances noted against the items concerned in the Original bills and attested by the Assistant Director at the time of signing the supplemental bills ?

17. (*a*) Are the pay bills and acquittances maintained properly in the prescribed form ?

(*b*) Is the certificate required by the note to S.R. 4(*d*) under T.R. 32 of the M.T.C. appended and attested after each day's transactions ?

18. Have the fines and recoveries entered in the order books been deducted in the Pay bills or on Acquittance rolls ? Check a fair number of entries.

19. (*a*) Is the Disbursing Officer's Register maintained properly and up to date ?

(*b*) Have all the entries made in it been attested by the Assistant Director or Superintendent who checked the Transactions ?

(*c*) Have the departmental figures been reconciled with the treasury figures and certificate appended before the statement is despatched ?

20. Are all cooly and line clearance bills duly cancelled after drawal ?

21. (*a*) What is the allotment sanctioned for the current financial year and what is the expenditure incurred under each head up to date ?

(*b*) Has timely action been taken to apply for additional allotment or to surrender any part of the existing sanctioned allotment under the several heads and with what results ?

(*c*) Is the statement prepared carefully and despatched promptly ?

22. (*a*) Is the stone pass list register maintained regularly and are the indents checked with pass lists and entered duly in the village stone accounts register before the bill is passed for payment to the contractor ?

(*b*) Are all pass lists and indents duly cancelled by the Assistant Director before signing a contractor's bill ?

(*c*) Are due precautions taken against the admission and passing of duplicate indents or cooly bills ?

23. Is the Inspecting Officer satisfied that sufficient precautions are taken and rules observed to prevent fraud and embezzlement ?

24. (*a*) Is the validation register maintained with all columns duly posted and attested by the Assistant Director of Survey and Land Records ?

(*b*) Is the nature of survey noted with Board's orders approving the same ?

(*c*) Have the Section 5 and 6(1) notifications been published as prescribed and details of the same noted in the register ?

(*d*) Are entries regarding 9(1) decisions posted correctly ?

25. (*a*) Is the register of 9 (2) notices maintained with all columns posted up-to-date ?

(*b*) What is the pendency in the issue of 9(2) notices and in the service of these notices ?

26. (*a*) Are the Land Complaint registers maintained Taluk-wise with up-to-date entries ?

(*b*) Are there any cases pending without any action for more than three months ?

27. (*a*) Is the Register of records received from C.S.O. and returned maintained ? (S.F. No. 66)

(*b*) Is the abstract put up every month showing the pendency under return of records at the end of the Register ?

(*c*) Are there any cases pending return for over one year ?

28 (*a*) Is the register of records issued and received from the field, maintained with all the relevant entries posted up-to-date ?

(*b*) Are there any cases of records pending receipt from field for over six months ?

29. *(a)* Is the register of village records (S.F. No. 109) maintained with entry of the invoice with date on which the records are received ?

(b) Are the receipt of records posted in the register correctly with reference to the invoices received from field ?

30. Does the records issue register (Office) contain proper acknowledgment from a responsible person for the records issued in Office ?

31. *(a)* Is the register of inspection reports posted properly and without any delay immediately on receipt of Inspection reports every month from the Inspecting Officers along with their diaries ?

(b) Are the Inspection reports posted locality-wise and Category-wise with an abstract at the end indicating the percentage to be done and done actually ?

32. Are the following registers maintianed ?

(a) Invoice Book for despatch of records.

(b) Register of Duplicate Invoices received in Office.

(c) Register of records issued to the Settlement Department.

33. Is the register for cost recovery statement received properly posted and prompt action taken to effect cost recovery ? Is the Order Book No. noted against each item of cost recovery ordered ?

34. Do the entries in the Order Registers indicate prompt action for the recovery of the amount in each case ?

35. Individual outturn of diary, outturn and monthly abstract of Junior Computor Draftsman, including A.R., P.R., G., etc.

(a) Are the diaries of the Junior Computor-Draftsman posted every day and are they being checked every day by the Sub-section heads and Senior Computor Draftsman ?

(b) Are the standards of outturn and the actual outturn realised by the Junior Computor Draftsman under each sub-process credited by them noted correctly under relevant columns ?

(c) Are letters P. or C. noted below the entries of the actual outturn realised to indicate whether the sub-process work is in progress or has been completed ?

(d) Are there cases of short work on the part of the Junior Computor Draftsmen ? If so, what is the action taken in such cases ?

36. Village-war register of outturn of Junior Computor Draftsman—

(*a*) Is this register posted with entries of all sub-process of work done inclusive of the work done in the C.P. Section?

(*b*) Are the entries posted locality-wise?

(*c*) Are the total number of survey fields, sub-divisions, theodolite stations, etc., noted against each locality?

37. 'G' Sub-section progress register and A.R. Sub-section progress registers.

Are these progress registers posted then and there correctly with reference to the sub-processes attended by the Junior Computor-Draftsman?

38. *Progress Register by processes (S.F. No. 76).*—Is this register maintained locality-wise and posted with reference to the various subprocess attended to by the Junior Computor-Draftsmen for each locality?

39. Register showing the village maps and Fair Area List prepared in office. Is it maintained correctly with up-to-date entries?

40. Is Register of Miscellaneous outturn maintained?

C.P. Section.

41. Register of examination of Traverse field books and Register of traverse errors in excess of allowances—

(*a*) Are these two registers maintained correctly?

(*b*) Are there any cases in which the traverse errors have exceeded the allowance?

Have such cases been reported to the Joint Director or Survey and Land Records, Madras, for orders?

(*c*) Has the Head-computor scrutinised the errors listed out in the traverse field books and obtained orders of the Assistant Director of Survey and Land Records for the rectification of defects?

42. A.B.C. & D., Progress Register—

(*a*) Is this register maintained with entries posted in it locality-wise?

(*b*) Do the items of sub-processes credited under 'C|D' agree with the number of stations noted as observed under 'B'?

43. *Progress in Survey Operations.*—(*a*) State the programme for survey operations under Re-survey, Survey under Act XXVI|63 Street Survey, Town Survey, Waste Block Survey, etc., for the year.

(*b*) Has this programme been kept up?

(*c*) Have fair Area lists due to Settlement or to Revenue Department been supplied according to the Schedule of dates prescribed?

44. (*a*) What is the progress of investigation work on the need for resurvey as ordered in G.O. Ms. No. 2066, Revenue, dated 25th November 1967?

(*b*) If so, has a programme been sent to the Board (SE) through the Director of Survey and Settlements and the Board's approval obtained?

45. (*a*) Has a phased programme of conversion of measurements and areas in the existing records into metric units, as a table process, been drawn up?

(*b*) Is the progress in this regard adequate?

46. *Touring.*—(*a*) Prepare a statement showing the number of days spent on tour (separately) indicating the number of marches and halts during the period of inspection and also showing the several items of work done.

(*b*) Has the touring done by the Assistant Director of Survey and Land Records been adequate and well distributed all over his jurisdiction?

47. *Court work.*—(*a*) Is the Assistant Director of Survey and Land Records attending to enquiry under the Tamil Nadu Survey and Boundaries Act, 1923?

(*b*) Have any orders of the Assistant Director of Survey and Land Records been appealed against and if so, with what result?

(c) Are the orders passed by the Assistant Director of Survey and Land Records just and proper?

48. Has the Assistant Director of Survey and Land Records been scrutinising properly the orders of the subordinates, passed under the survey and boundaries Act, 1923, with a view to pointing out defects if any?

APPENDIX NO. XXIX.

FINANCIAL POWERS DELEGATED TO SUBORDINATE OFFICERS OF THE SURVEY AND LAND RECORDS DEPARTMENT.

1. *List of authorities in the Survey and Land Records Department empowered to execute contracts, deeds, etc., on behalf of the Governor.*

Under Article 299 (1) of the Constitution of India, the Governor has directed the undermentioned classes of deeds, contracts and other instruments shall be executed as follows:—

(1) Mortgage deeds given as security in connection with the employment of Accountants and Clerks in-charge of Stores.	By the head of the office. (Item 3b—Appendix 4 to T.N.F.C., Volume II.)
(2) Contracts or agreements for the supply of survey instruments.	By the Secretary, Board of Revenue or Ex-Officio Secretary, Board of Revenue, Settlement of Estates. (item 22—Appendix 4 toT.N.F.C.' Volume II.)
(3) Contract or agreements for the supply of bazaar articles and chemicals.	Deputy Director in-charge, Central Survey Office, Madras. (Item 23—Appendix 4. T.N.F.C. Volume, II.)
(4) Contracts or agreements for the supply of demarcation stones.	Asst. Director of Survey and Land Records in-charge of District Survey Unit. (Item 24—Appendix 4, T.N.F.C., Volume II.)
(5) Indemnity bonds from persons employed in the Survey Units and Central Survey Office.	By the Assistant Director and Deputy Director of Survey and Land Records in-charge of Survey Units and Central Survey Office respectively.
(6) Contracts or agreements relating to leases for the occupation of private buildings to accommodate the offices of the Survey Units.	By the Assistant Director of Survey and Land Records in-charge of the Survey Units. (Item 38-2., Appendix 4—T.N.F.C., Volume II.)

2. Special rules restriction etc., regarding particular items of contingent expenditure.

(1) *Bicycles-Repairs.*—The head of an office may have a bicycle supplied to his office repated locally or at the nearest repairing centre. If the repairs required to the frame of a bicycle including transit charges would cost so much that in his opinion it would be more economical to purchase a new bicycle, he should condemn the machine with the sanction of the head of the department, who may sanction the purchase of a new bicycle in the place of the one condemned.

(Item 6—Appendix 5, Tamil Nadu Financial Code, Volume II).

(2) *Books and Publications.*—Delegation of powers—Subject to the general rules contained in Article 93 and the preceding rules, and to any special restriction, limit or remarks mentioned against any particular entry below, the following authorities are empowered to sanction the purchase of books and maps required for the use of their own offices and officers subordinate to them :—

Authority.	*Special restrictions limit or remarks.*
Director of Survey and Settlements ..	According to powers delegated in G.O. Ms. No. 2200, Revenue, dated 24th August 1949 the Director of Survey and Settlements, Madras have been vested with powers for sanctioning (1) purehase of books and maps required for his use and use of his subordinate officers without any limit. (2) Purchase of periodicals and Newspapers without any limit.

(Item 8—Appendix 5 T.N.F.C. Volume II.)

3. *Supply of cross belts and badges to the Last Grade Government Servants.*—The head of an office may arrange departmentally for the supply of cross belts and badges to daffadars and last grade government servants at the rate of one for each post, when the belts and badges are supplied, as part of a livery. Gold-laced cross belts should be only to daffadars and ordinary cloth cross belts to last grade government servants. The belts should not be replaced at Government expense more often than once in four years for a daffadar's belt and once in two years for a last grade government servants belt. If it is found necessary to replace a belt after a shorter interval owing to cardless usage or any other cause that could have been avoided or to replace a badge for a similar reason, the cost should be recovered from the subordinate concerned. A contingent bill on which any charge for belts or badges are drawn should show the date and other particulars of the lasts supply.

[Item 10 (iv)—Appendix 5, Tamil Nadu Financial Code, Volume II.

(4) *Conveyance charges.* (*A*) (1) *Gazetted officers in the Madras City.*—When Gazetted Officers in the Madras City undertake journeys on official business such as in connection with Assembly Sessions, attendance in Courts as official witnessess and attendance in the Office of the Public Service Commission in connection with direct recruit ment of candidate for Government Service they may be permitted to draw the actual conveyance charges incurred by them on such trips from their office contingencies, provided.

(*a*) that the heads of departments, in respect of Gazetted Officers working under them consider the claims as admissible on merits ; and

(*b*) that the heads of departments, as the case may be, furnish certificates, along with the contingent bills in which the conveyance charges of Gazetted Officers under their control are claimed, that the officers are not in receipt of any regular conveyance allowances.

(Finance Memo. No. 110167-EA|54-1, dated 11th December 1954.)

A (2) *Other Government Servants.*—When a non-gazetted or inferior Government Servant is sent on duty to a place at some distance from his office, or is summoned at his office by a special order of a Gazetted Government Servant outside the ordinary hours of duty the head of office may order that the expenditure involved be debited to the contingencies of the office provided,

(*a*) that the head of the office certifies that the expenditure was actually incurred, was unavoidable and is within the scheduled scale of charges for the conveyance used,

(*b*) that the Government Servant is not entitled to draw any travelling allowance for the journey, is not granted any compensatory leave, and does not and will not receive special remuneration for the performance of the duty that necessitated the journey.

[Item II-A(1) and II-A(2) Item 12 Appendix—5 Tamil Nadu Financial Code, Volume II.]

5. *Electric bulb and lamp charges.*—The purchase of electric bulbs required for non-residential buildings should be made by the department occupying the building and the expenditure therefore should be debited to the budget of the department occupying the

building. With a view to avoid inconvenience to several offices and to controlise procurement of lamps in an economical and efficient manner, the supply and stock of lamps will be made by the Electrical Engineer (General) in respect of the installations under his control. The lamps will be handed over to the departments when demanded and the cost debited to the budget of the respective departments.

(Item 17, Appendix 5 Tamil Nadu Financial Code, Volume II).

In regard to purchase of incandescent bulbs the Department occupying a non-residential building, can meet its requirements by stocking not less than eleven numbers at a time, to replace the bulbs that may get fused due to fair usage as provided for in the Public Works Department Code.

(6) *Freight charges.*—The sanction of a competent authority for the purchase of any article carries with it sanction for incurring the necessary freight charges also provided that the cost of the article including freight is within the sanctioning powers of the authority that sanctions the purchase.

The following procedure should be observed in regard to the payment and adjustment of freight charges on imported stores.—

(i) If any freight is payable in India on stores consigned by the Store Department, London, the State Port Officer in Madras City or the Port Officer concerned in the muffassil should forward the bill to the Accountant-General through the Steamer agents for adjustment.

(ii) If any freight is payable in Madras City on stores not consigned by the India Store Department, London, the State Port Officer should forward the bill to the departmental authority concerned for payment. If any freight is payable on such stores at a muffassil port, the steamer agents should submit the bill direct to the departmental authority concerned for payment.

(iii) A bill for freight payable by the Government should invariably be supported by the receipted bill of loading or original tonnage—statement, as the case may be.

(Item 24, Appendix 5, Tamil Nadu Financial Code, Volume II.)

(7) *Furniture (including record racks, rattum mats, blinds, table-cloth, clocks and time pieces, fire fighting equipment and office scales and weights)*:—The Assistant Director of Survey and Land Records incharge of Survey Units and Deputy Director Central Survey Office may sanction expenditure upto Rs. 100 subject to the general rules regarding the purchase of stores in Chapter VII of Tamil Nadu Financial Code, Volume 1. The limit refers to the cost of each article or any number of articles of the same kind purchased at any one time, whether for one office or any number of offices, (G.O. Ms. 1038, Finance dated 24th August 1961 and Government Memo. No. 88431, codes 64-7,dated 2nd May 1965.) The Director of Survey and Settlements may sanction the purchase of each item upto Rs. 500 according to the delegation of powers in G.O. No. 2200, Revenue, dated 24th August 1949.

(Item 25 of Appendix 5, Tamil Nadu Financial Code, Volume II).

(8) *Hot and cold weather charges.*—A controlling authority should make a specific allotment to each officer under its control for hot and cold weather charges. The use of punkhas and electric fans for non-gazetted establishments should ordinarly be limited to the months of April to September, but the head of an office may extend such use to the months of March and October also, if the concession is really necessary. In exceptional cases, the head of a department may allow the use of punkhas and electric fans for non-gazetted establishments during other parts of the year if he is satisfied that there is a real necessity for it.

The supply of goglets and tumblers in all offices during the hot weather should not exceed the scale laid down below.

Class of Government Servants.—Scale of supply.

Gazetted Government Servants.—One glass tumbler and one earthen ware goglet for each, once in a year.

Non-gazetted Government Servants.—One glass tumbler for each non-gazetted Government Servant and one earthen ware goglet for a group of four non-gazetted Government servants, once in a year, in cases not covered in clause (*b*) below.

(*b*) One plastic tumbler and one earthen pot common for all attenders and subordinates of similar status, last grade government servants and other menials in an office, once in a year.

(Item No. 30, Appendix 5, Tamil Nadu Financial Code Volume II)

(9) *Menials paid from contingencies.*—Heads of departments and other authorities empowered to draw contingent bills may sanction the employment of unskilled menials on non-pensionable establishments whose pay is debited to contingencies, provided that the rate of pay does not exceed a maximum of Rs. 15 a month. Unskilled menials include mesalchits, sweepers, cleaners, punkah-pullers, watchmen, water-suppliers, scavengers, dhobies, gardeners, etc.

Exception.—The maximum rate of pay of Rs. 15 a month will not however be applicable to the watchmen, including night watchmen.

The pay of all watchmen including night watchmen should be regulated with reference to the prevailing market rates from time to time. Such of the night watchmen as are employed in the City of Madras will, in addition be eligible for the Madras allowance of Rs. 2 per mensem.

The maximum rate of pay for unskilled menial or a skilled labourer should not be sanctioned as a matter of course, the pay of each post should be fixed with due regard to the nature of the work and the prevailing market rate of pay for the class of work required. No unskilled menial or skilled labourer paid from contingencies may be paid at a rate exceeding the relevant maximum laid down above, unless the Government have specially sanctioned it.

The pay of a menial paid from contingencies who is temporarily taken into camp in exceptional circumstances may be enhanced for the period of tour by an amount not exceeding the travelling allowance admissible under the Madras Travelling Allowance rules to Government Servants of the lowest grade, provided that he would have been eligible for daily allowance during the tour if he had been working on the regular establishment. The enhanced pay in lieu of Travelling allowance may be raised by 50 percent in the case of journeys in the special tracts included in class I and by 33-1|3 per cent in the case of journeys in the localities included in class H, in Annexure V to the Madras Travelling Allowance Rules.

NOTE.—Chainmen in the Survey department are, however, eligible for travelling allowance as provided in Annexures II and III of the Tamil Nadu Travelling Allowance Rules.

Note 2.—For purposes of departmental scrutiny and general audit, all drawing offices should describe in their contingent bill and registers the class to which each menial belongs, so that the controlling officers may be able to see during inspections that the rates are not *prima facie* extravagant.

Note 3.—Each head of a department should forward to the Accountant-General annually in April a consolidated certificate in the following form in support of the wages fixed for menials:—

"Certified that the rates of pay allowed for the different classes of menials are fixed with reference to the prevailing market rates, and are within the maximum rates laid down, by the Government in item 37 of Appendix 7, Tamil Nadu Financial Code, except in cases for which the Government's special sanction has been obtained for the rates paid."

(Item 39, Appendix 5, Tamil Nadu Financial Code, Volume II.)

10. Mosquito netting.

1. The Head of an office or a Gazetted Government Servant to whom the head of the office has delegated the power of drawing establishment pay bills, may sanction an advance for the purchase of mosquito nets to all permanent non-Gazetted Government Servants resident or working in Government offices in places where there is risk of malaria or filaria. Officiating and temporary men who are not likely to be ousted within the period of repayment will also be eligible for the advance. The advance will be free of interest.

A list of areas where there is risk of malaria or filaria will be drawn up by the Director of Public Health and communicated to all Heads of departments for information.

In areas which are malarial as well as filarial the advance for the purchase of mosquito nets should be drawn only once either for malaria or for filaria. (2) The advance shall be limited to the amount actually required for the purchase of mosquito nets in each case for the use of the Government Servant and the members of his family, subject to a maximum of one months' pay including dearness allowance or Rs. 50 whichever is less.

A subsequent advance may be sanctioned on the expiry of five years from the date of sanction of a previous advance, a certificate being recorded in the sanction orders to the effect that the net purchased with the previous advance has become unserviceable. The advance for the purchase of mosquito nets will not be admissible for the members of his family, if they do not reside with him and are stationed at a different place.

3. The advance should be recovered in equal monthly instalments not exceeding 12 by deduction from pay bills. In the case of Government Servants drawing comparatively higher rates of pay, recovery may be effected in a smaller number of instalments. The recovery will commence from the month subsequent to that in which the advance is drawn, e.g., if the advance is drawn in January 1956, the first recovery will be on the 1st February 1956 on pay drawn for January 1956. The recoveries will be made whether the Government servant is on duty or on leave.

4. The detailed accounts for the advances granted should be maintained and recoveries watched by the departmental authorities concerned. At the end of every official year, the head of each department should send to the Accountant-General a certificate of acceptance of balance outstanding in that department similar to the certificates furnished in the case of other special advances mentioned in Article 246, Tamil Nadu Financial Code, Volume I.

5. A Government servant, who takes an advance for the purchase of mosquito nets, should furnish to the sanctioning authority, within one month after drawing the advance, a certificate stating either (*a*) that he has utilized the full amount of the advance for the object for which it was granted or (*b*) that he has refunded into the treasury the balance of the advance in excess of the actual price paid for the mosquito net. The Gazetted Officer or the head of the office, who draws the pay bill of the Government servant concerned, should attach a certificate on the first pay bill cashed after the advance has been drawn and utilized that he has seen the voucher for the purchase of the net. If the Government servant draws his own pay bill, the certificate should be furnished by the gazetted officer, under whose immediate control he is working.

(Item 40 (1), Appendix 5, Tamil Nadu Financial Code, Volume II.)

11. *Office expenses.*—(1) Charges for such items as the following fall under this head :—

Gum pots, rat traps, brooms, nails, soap, vinegar, water pots, ropes, matches, firewood, chalk, glue, paste, thread, umbrellas for Last Grade Government Servants, mats, winnows, lighting, other than electric, cloth for records, binding, advertisements, dhobying, supply of drinking water, renting of post boxes, postal commission on money orders and value payable parcels, local purchase of books of money order, telegraph and value payable post forms, postal and railway guides and incidential expenditure connected with durbars held by Collectors for the presentation of badges and sanads to the receipients of titles.

The nature of each charge should be described in detail in the contingent bill.

Note 1. Railway guides may be bought only if there is a touring officer in an office or if witness batta has to be paid.

NOTE—2. Charges for the packing and carriage of articles belonging to an office are treated as Office expenses when they are not incurred in connection with tours.

(iv) *Umbrellas.*—Only cadjan unmbrellas should be supplied to Last Grade Government Servants, unless a cloth umbrella has been included in the scale of livery by the authority fixing the scale.

(v) *Money order charges—General.*—Charges on account of the issue of money orders may be treated as contingent expenditure by all Government servants who are authorised to draw contingent bills, when a remittance by money order is unavoidable and is necessary in the interests of the public service. [See also clause (3) of Treasury Rule 7 (2) and Instruction 28 under Treasury rule 16.] (*b*) Remittance of pay and allowances :—The Pay travelling allowances and contingent charges of subordinate Government Servants employed in out-of-the-way places may be remitted by money order at the expense of the Government when the head quarters of the subordinate is more than five miles from the treasury, provided that the money order commission will not be more than the travelling allowance payable if Last Grade Government Servants were sent to encash the bill, cash order or Government draft, as the case may be. In special circumstances, e.g., when a Last Grade Government Servant cannot be spared or the journey is risky, the head of a department, may permit such remittance even when the money order commission exceeds the travelling allowance that would be payable to a Last Grade Government Servant.

The Pay of village establishments may be remitted by money order at the expense of the Government when the village is at least twenty miles from the treasury.

[Item 42 (1) iv, v and b, appendix 5, T.N.F.C. Volume II].

12. *Rents of private Land and Buildings.*—Powers have been delegated to the Director of Survey and Settlements to sanction office rents upto a limit of Rs. 400 a month at a time in each case where the accommodation is provided in a separate building, and when it is provided in a building partly used as private residence rent proportionate to the extent of the main building set aside solely for office use, subject to a maximum of half the rent of the building or Rs. 45 a month whichever is less.

(G.O. Ms. No. 322, dated 13th February 1969. B.P. Rt. 148/69, dated 22nd February 1969).

13. *Service postage and telegram charges.*—The following instructions supplement to those contained in Article 119:—

(*a*) No charges should be entered in any contingent bill for any postage stamps other than service postage stamps, except when they are required for letters or other articles to be sent to foreign countries, i.e., countries outside the British Empire.

(*b*) Whenever the cost of establishment is divided between two heads, the charge for service postage stamps should be divided in the same proportion.

2. (a) Government Servants should not send communications of any kind regarding their leave, pay, transfer, leave salary, fund subscriptions and other analogous matters at the expense of the State, as such communications are private and not official.

(b) Unless the Government have ordered in any particular case or cases, all letters sent by Government Servants in their official capacity in reply to communications of any kind received from private individuals or associations should be despatched "Service Paid".

Certified copies of documents and unused copy stamp papers in cases (i) where the number of copy stamp papers supplied by applicants is in excess of requirements, (ii) where an insufficient number of stamps is filed, but the parties fail to supply the additional number of stamps within a given period and (iii) where stamps are filed for copies of records which are not available in the office, should be sent to the parties concerned in envelopes superscribed "Certified copies—Service unpaid" or "copy stamp papers—Service unpaid" or "Certified copies and copy stamp papers—service unpaid".

NOTE.—Sheets of copy stamp papers received from an applicant remaining unused as a result of the document having been typed or copied too closely should not be returned to the party but should be sent to the nearest treasury.

In the event of any envelope being returned undelivered, the head of the Office concerned should pay the postage from his office contingencies. The cover and its contents should then be retained for two weeks so that, if the addressee appears and applies for the copies in person, they may be handed over to him after recovering the cost of the postage paid from contingencies. If he does not so appear, the certified copies should be destroyed and a note of such destruction made in the remarks column of the copy application register against the item concerned. The unused copy stamp papers, if any, should then be sent to the local or nearest sub-treasury to be added to the stock.

3. Bearing postage paid in cash should be separately noted in contingent bills.

Payment for telegram charges.—(*a*) Payments for telegrams despatched on the public service, whether sent from Government or Railway Telegraph Offices, should be made in cash from the permanent Advance of the Office concerned.

(*b*) State telegrams should be classed as "Express" or "Ordinary" as the sender thinks proper. Government servants should bear in mind the necessity for keeping the following general principles:—

(1) A telegram should not be sent when a letter would serve the same purpose equally well.

(2) State telegrams should, as a rule, be classed as "Ordinary".

They should be classed as "Express" only—

(i) In case of great emergency, and

(ii) When the sender knows that the line is blocked and considers his message sufficiently important to take precedence of ordinary traffic.

(3) Except when extreme precision is important, state telegrams should be expressed in as few words as possible; mere auxiliary or connective words should be omitted, when it is obvious that the receiver will be able to fill them in for himself without any difficulty.

NOTE.—1. When a telegraphic cypher code has been supplied, the code should be used as far as possible.

NOTE 2.—Books of telegram forms required for official use may be obtained on payment from any principal Post and Telegraph Office.

(*c*) If a Government servant asks for repetition of telegram received by him in his official capacity he will not be required to pay any transmission charge in the first instance. If however, the repetition reveals no error on the part of the telegraph service, the necessary charge will be recovered.

14. *Telephone charges.*—(1) No new telephone connection may be sanctioned except with the previous approval of the Government.

(2) Heads of offices may incur expenditure without any monetary limit in each case in Madras City and Rs. 50 (Rupees Fifty only) in the muffassal for shifting telephones from one place to another. The Chief Engineer, Public Works Department (General), may

incur expenditure upto a limit of Rs. 50 in each case in the Madras City and in the muffassal for shifting telephones from one place to another. The limit for other petty charges is Rs. 30 in each case.

(3) The number and date of the Government Order sanctioning the expenditure on new connection should be quoted on the bill in which the charges for it are claimed.

(4) Subscribers are responsible for meeting in full bills for all trunk calls made for their telephone connections irrespective of the person who made the call. All the Government subscribers should accept in full the bills prepared against them by the Telephone Accounts Office concerned, even if some of the items pertain to the private business of the official concerned. The department concerned should make its own arrangements for recovery from its officials of the value of the private calls made and for accounting for such items in its own office accounts. Recovery thus made should be taken in reduction of expenditure and not credited as revenue receipts. In order to check up the trunk call bills presented by the Posts and Telegraphs Department, a Trunk Call Register in the following form should be maintained by all the offices and officers who have been provided with telephones either at offices or in their residences:—

Register of trunk calls made from Phone No. . . . . (Town)

Date and time.	*Nature of trunk call (ordinary, urgent or immediate whether particular personal call).*	*Whether concessional rate applies and if so, what.*	*Trunk calls booked by.*	*Trunk call to whom, at what station and Number*	*Purpose of call.*
(1)	(2)	(3)	(4)	(5)	(6)

Certificates to the effect that the charges on account of trunk calls included in the bills have been verified with the entries for the period in this register and the charges found to be correct should be furnished in the bills presented for trunk telephone calls made by the various departmental offices. A corresponding entry showing the number and date of the bill in which the trunk call charges have been drawn should also be noted in this register.

(Item 58—Appendix 5 T.N.F.C. Volume II.)

15. *Tents and camp furniture.*—1. The initial supply of tents requires the sanction of the Government. Once the supply is sanctioned, the head of the department concerned may sanction each individual purchase.

II. *Cost of carriage of tents.*—The cost of transport of tents in whole or in part is debitable to the Government only when they are carried on tour beyond a distance of five miles, and no amount may be debited to the Government in excess of the amount admissible on account of transport by the shortest routes. When a Government servant carried tents on tour for use by his office subordinates, they may be carried at Government expense, in other cases, the cost of their carriage may be recovered as follows:—

When tents are carried by road or canal the actual cost of their transport subject to a maximum rate per mile for the distance travelled at half the milage rates sanctioned in Annexure 1 of the Tamil Nadu Travelling Allowance Rules, may be debited to the Government. A Government servant mentioned in the Annexure to Appendix 5 of T.N.F.C., Volume II may when he claims actual expenses for railway journey, recover the actual cost of transporting camp equipment and tents up to the maximum amount of each shown against him in the Annexure.

Exception 1.—When a Government servant is in receipt of a fixed travelling allowance and carries tents on tour for his personal use, only half the expense of the carriage of tents may be debited to the Government.

Exception 2.—Non-gazetted subordinates of all departments who have been supplied with Government tents may transport them at the expense of the Government when travelling in the Scheduled Areas, whether they are used for office or for private purposes.

III. Repairs.—Charges for the repair of tents may be incurred under the sanction of the head of the department.

(Item 59 Appendix 5 T.N.F.C. Volume II).

ANNEXURE.

Maximum weight of Government tents and camp equipments which Government servant may transport at the expenses of the Government on their tours.

	Maximum weight of camp equipment.	
	Tents (including poles, pegs, Mallets, Durries, Salitas, Chicks, etc. and camp furniture.	*Camp Furniture when tents are not carried.*
	Maunds. (82 2/7 L.B.)	*Maunds.* (82 2/7 L.B.)
	(2)	(3)
Survey :		
Assistant Director of Survey in-charge of Survey unit.	25	5
Additional Officers of Survey Unit.	25	..
Inspectors of Survey and Land Records.	8	..
Head Surveyors	..	3

16. Rules for the supply of **Stationery and Printing Stores for the Public Service.**

I. The Three-men committee consisting of Joint Director of Survey and Land Records, The Deputy Director of Survey, Central Survey Office, Madras and the *Works Manager Central Survey Office.* may sanction the purchase of the following articles upto the limits noted against each for use in the Photo Zinco press, attached to Central Survey Office, Madras.

(*a*) Reproduction Stores. (*b*) Litho and Offset inks. (*c*) Tools and Petty Plants. (*d*) Reproduction, Printing Mounting plant and machinery. (*e*) Spare parts. (*f*) Bazaar articles. (*g*) Chemicals. (*h*) Map Mounting materials.	Upto a limit of Rs. 1,000/ at one time for any one article or a number of articles of the same description either by contract or by invitation or tenders or otherwise.

2. The committee may also sanction expenditure on repairs to reproduction, printing and Mounting Plant and Machinery upto a limit of Rs. 1,000 at one time:—

II. The Two men committee consisting of the Deputy Director of Central Survey Office, Madras and the Works Manager Central Survey Office, Madras may also sanction the purchase of the following articles upto a limit of Rs. 50 at any one time for use in the Photo Zinco Press, Madras:—

(*a*) Reproduction Stores.

(*b*) Litho and Offset Inks.

(*c*) Tools and Petty Plants.

(*d*) Reproduction, Printing, Mounting Plant and Machinery.

(*e*) Spare parts.

(*f*) Bazaar articles.

(*g*) Chemicals.

(*h*) Map Mounting materials.

The Committee may also sanction expenditure on repairs to reproduction, Printing and Mounting Plant and Machinery upto a limit of Rs. 50 at any one time. (Vide G.O. Ms. No. 2179, Revenue, dated 27th July 1959 and B.P. Mis. No. 1476 (N), dated 30th November 1959 and Government Memo. No. 87162-E3-59-3, dated 18th January 1960.

Motor Vehicles.—(Jeeps and Land Rover) Rules for the control of the use, maintenance and repair or Motor Vehicles of the Departments of the Government are embodied in Appendix 26 (*See* Chapter XIV, Article 328-A) of Tamil Nadu Appendix 26 (See Chapter XIV, Article 328-A) of Tamil Nadu Financial Code, Volume II (Edition Fifth.)

Revised precedure for sanctioning expenditure on repairs to the Government Vehicles (Jeeps and Land Rover) ordered in G.O. No. 356, Home, dated 1st February 1965 and subsequently expanded in G.O. Ms. No. 3063, Home, dated 13th September 1966 gives details of the nature and limit of expenditure that could be met by the Departmental Offices. For vehicles which have served for over eight years from the date of purchase, a sum of Rs. 1,000 (Rupees One thousand) in all in a year in respect of a light vehicle like Jeep and a sum of Rs. 1,500 (Rupees One thousand and five hundred) in all in a year in respect of any other vehicle may be incurred towards expenditure on repairs and replacement by the Officer concerned subject to prior technical sanction and scrutiny. Whenever the expenditure on repairs and replacement is likely to

exceed the above limit, the Head of the Department concerned shall approach the Government for sanction.

(G.O. No. 3063, Home, dated 13th September 1966.)

A lump sum of Rs. 8,000 (Rupees eight thousand) may be provided for a period of four years on repairs and replacement (exclusive of the expenditure on running cost such as petrol, oil, salary and allowances paid to drivers, tax on vehicle, etc.) to each vehicle (other than motor cycle), and the provision distributed as shown below :—

First year of its purchase	Rs 800
Second year	Rs. 1,600
Third year	Rs. 2,600
Fourth year	Rs. 3,000

For the repairs and maintenance during the subsequent years, a total expenditure up to Rs. 8,000 (Rupees eight thousand) may be incurred for a period of four years per vehicle subject to a ceiling of Rs. 3,000 per year. The Heads of Departments will prepare a Statement showing the amount to be provided in the budget under repairs by each officer in-charge of the vehicle. The budget provisions so made shall be within the ceiling prescribed above. The Officer in-charge of the vehicle may incur the expenditure up to the budget provisions without obtaining the administrative sanction of any Superior officer. He should however incur the expenditure only after obtaining the technical approval of the office of the Motor Vehicles Maintenance Organisation concerned with regard to the rates of labour charges claimed in the bill and on each item of repairs that essentially to be carried out on a vehicle.

The spare parts required for the vehicle shall continue to be purchased only from the Officer-in-charge of Central Stores or the Automobile Engineers and their value shall be taken into account. Items not available in these sources may be obtained locally after following the rules in force. The Officer-in-charge of the vehicles should however incur the expenditure after obtaining the technical approval of the Motor Vehicles Maintenance Organisation with regard to the need for replacement and the reasonableness of the rates claimed by the company. If there is any need for incurring the expenditure over and above the limit prescribed for each year, the Officer-in-charge of the vehicle shall obtain the sanction of the Head of the Department, furnishing full history sheet of the vehicle and complete particulars on the expenditure incurred on the vehicles and the circumstances which necessitated the incurring of the expenditure over and shown the ceiling prescribed.

APPENDIX No. XXX.

Standard specifications for survey Instruments.

The Indian Standard specifications for the several survey instruments have been published by the Indian Standards Institution, Manak Bhavan-9, Bahadur Shah Zafar Marg, New Delhi-1. Copies of the booklets are available for sale at the said Institution and may be obtained for reference while calling for tenders and checking of the quality of specimens and the articles when supplied. The specification numbers are given below:—

1. Metric surveying Chains	IS : 1492—1959
2. 4-Metre Levelling Staff, Folding type	IS : 1779—1961
3. Surveying Chain Pins (Arrows)	IS : 1842—1961
4. Metric Diagonal Scales	IS : 1562—1962
5. Protractors	IS : 1563—1962
6. Pantograph	IS : 2286—1963
7. Beam Compasses	IS : 2466—1963
8. Plane Tables	IS : 2539—1963
9. Metric, Woven Metallic and Glass Fibre Tape Measures	IS : 1269—1964
10. Theodolite Optical	IS : 2976—1964
11. Metric Steel Tape Measures (Winding) Type	IS : 1270—1965
12. Vernier Theodolite	IS : 2988—1965
13. Engineers' Drawing Instruments Dividers	IS : 3206—1965
14. Straightedges	IS : 2233—1962
15. Engineers' Drawing Instruments Drawing pens	IS : 3210—1965
16. Spring Balances	IS : 1702—1967
17. Parallel Rulers, 150 mm (Link Type)	IS : 3218—1968
18. Proportional Compasses—150; 200 and 300 m.m.	IS : 5153—1969

APPENDIX No. XXXI.

(Survey Manual Chapter I—Rule 8)

Form of notice calling for Tenders for supply of Demarcation Stones.

GENERAL NOTIFICATIONS.

Tender Notice.

Sealed tenders for the supply of demarcation stones of the dimensions given below for Resurvey .... Land Records Maintenance and all other items of survey work in the villages, panchayats and Municipal Towns in the Taluks of .... of .... district, for a period of .... years from the date of agreement, are invited by the Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector .... acting for and on behalf of and by the order and direction of the ....

2. Tenders should be sent in double sealed covers, superscribed "Tenders for the supply of Survey demarcation stones in .... district" and should be addressed to (by name) ....Assistant Director of Survey, Land Records and Personal Assistant (Survey) to the Collector ....Separate tenders should be sent for each Taluk and should reach the above said on or before...... .... on... .... and the tenders will be opened on the same date in the presence of the tenderers who choose to be present at............................on .. .. at the Office of the Assistant Director of Survey and Land Records ....

3. The tenderers should deposit a sum of Rs. .... (Rupees .... only) per taluk, in a Government Treasury under "Revenue deposit" as earnest money deposit and enclose the chalan with the tender. The rates at which the tenderer is prepared to supply stones should be quoted in the Tender. The rates quoted should include the cost of carriage and should be uniform for the Taluk as a whole. Every tenderer should attach to his tender (1) a solvency certificate, issued by the headman of the village, where his properties are situated and countersigned by the Tahsildar, (2) Income-Tax and Sales-Tax clearance certificates and (3) Statement of data for the rates ten-

dered. Deposits made or certificates submitted in respect of any other tenders or subsisting contract will not be taken into account for this tender. Tenders that do not completely satisfy the conditions of the notice will be treated as invalid and left out of account.

4. The Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector reserves to himself the right of rejecting any tender without any reason therefor and of selecting one or more contractors for any or all of the Taluks.

5. The deposits of unsuccessful tenders will be returned immediately after the tender is accepted. The successful tenderer will have to enter into an agreement with the Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector within a fortnight from the date of acceptance of the tender. The Tender deposit will be the cash security for the fulfilment of the terms of the contract. If the successful tenderer fails to execute the agreement or fails to supply stones as per the terms of the contract, his deposit will be forfeited to Government and in addition any balance amount that may be required to make up the total loss incurred by Government as a consequence of such failure will be recovered from him.

6. The contract shall be liable for summary termination for failure of the contractor to supply stones within the time prescribed for complying with the indents, and or violation of any terms of the agreement. The contract can be cancelled at any time by the Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector .... after giving a month's notice, in writing of his intention to terminate the contract. The contractor shall not be competent to withdraw from the contract for a period of two years from the date of execution of the agreement. The contractor may thereafter if he wants to terminate the contract, withdraw from the contract after giving a month's notice to the Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector .... in writting of his intention to terminate the agreement entered upon. The deposit money referred to shall be liable to be forfeited in whole or in part of non-compliance with any of the conditions of the contract. The selected contractor is liable for all the losses consequent on his failure to supply stones during the period of his contract-namely .... years and it will be open to Government to make suitable alternative adhoc arrangements for the supply of stones because of his failure during the currency of his contract. The deposit money shall be

returned to the contractor only on complete fulfilment of the contract to the satisfaction of the Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector..............

7. Demarcation stones should be supplied in such quantity as may be indented and at such places specified. The stones must be of good granite. The contractor will on receipt of indents in writing from the Tahsildars of the Taluks of .... the Inspectors of Survey and Land Records, and the Special Deputy Collectors working in .... district, supply within a month the number of stones mentioned in the indents. They will be passed by the Divisional or Mobile Head Surveyor or Inspectors concerned. Stones which on inspection are found to be not of the prescribed dimensions and quality will be rejected. As soon as the stones are passed, the contractor shall cause them to be carried to the villages specified in the indents, deliver the stones to the village munsiff of the village concerned, obtain his receipt and send the same along with the consolidated bill, to the officer competent to pay the bill.

8. No advance of cash will be made to the Contractor. Payment for the stones supplied will be made only after the bills are checked and passed. Payment will be made by the Tahsildar concerned for stones supplied on indents placed by him, by the Assistant Director of Survey and Land Records .... for stones indented by the Inspector of Survey and Land Records and by the Special Deputy Collector concerned for the stones indented by him.

DESCRIPTION OF STONES.

Description.		Dimension
1. Theodolite stones	...	90 cm×22.5 cm×22.5 cm.
2. Theodolite stones	...	45 cm×20 cm×20 cm.
3. Field stones	...	60 cm×15 cm×15 cm.
4. Chain Survey stones	...	30 cm×15 cm×15 cm.

All stones must be of good granite of durable quality and must have a broad arrow cut on one side not less than 0.6 cm. deep and 10 cm. long. In addition, theodolite stones of description (1) must have plummet hole drilled in the centre of the upper surface 2.5 cm. deep and 1.9 cm. in diameter. Theodolite stones of description (2) must have the broad arrow deeply cut at the top having

the point of arrow in the middle of the top serving as plummet hole. The arrow should be 6.25 cm. long and 1.25 cm. deep. The three lines forming the arrow should each be not less than 6 cm. in length and 1 cm. in depth.

In addition, the chain survey stones must have a St. George's cross 7.5 cm. long on the top.

All stones must be roughly squared to one-third of their length from the top.

....

Assistant Director of Survey and Land Records and Personal Assistant (Survey) to the Collector.

....

Date:

APPENDIX No. XXXII.

G.O. Ms. No. 502, Revenue, dated 10th February 1958.

Copy of G.O. No. 502, *Revenue Department, dated* 10*th February* 1958.

Maps.—Maps printed in the Central Survey Office, Madras—Consolidated revised distribution list—Approved.

READ.—the following papers :—

G.O. No. 2210, Revenue dated 21st August 1951.

Memorandum No. 8257-E;53-15, Revenue,dated 23rd August 1954.

From the Board of Revenue, B.P. Rt. No. 6357, dated 27th December 1955.

Memorandum No. 24866-E;55-5, Revenue, dated 20th November 1956.
Memorandum No. 24866-E-55-17. Revenue, dated 9th January 1957.
From the Board of Revenue, L. Dis. No. N. 14624–56, dated 18th June, 1957.

Memorandum No. 24866-E 3;56-26, Revenue, dated 6th November 1957.
From the Board of Revenue, L. Dis. No. N. 16640-57, dated 2nd January 1958.

ORDER—No. 502 **Revenue, dated 10th February 1958.**

In G.O. Ms. No. 2210, Revenue, dated 21st August 1951, the scale of supply and distribution of different kinds of maps printed in the Central Survey Office, Madras, was prescribed. On account of a variety of reasons including the reorganization of States and expansion of departments, it has become necessary to revise the scale of distribution based on requirements. The Board has now submitted a final consolidated revised list embodying the requirements of all departments. This list is approved. The revised scale of distribution of different kinds of maps as approved by the Government is shown in Annexure I to this order. The lists submitted by the Board of Revenue as Annexures II to XVI are also approved and are appended to this order.

2. The Board's proposals to supply only paper copies of maps and to distribute bound volumes of Tamil Nadu District Atlas to all Officers (i.e., those who are entitled for free supply) are also approved.

(By order of the Governor)

C. RAMACHANDRAN,

Deputy Secretary to Government.

ANNEXURE I.

Serial number. (1)	*Department and their subordinates.* (2)	*Revised scale for supply.* (3)
	TAMIL NADU WALL MAP.	
1	Town-Planning Department—Director of Town Planning ..	1
1/A	,, ,, Joint Director of Town P[anning ..	4
2	Judicial Department—Honorary Director of Legal Studies, Law College.	1
3	Registration Department—	
	Inspector-General of Registration	1
	Registrar of Firms	1
4	Education Department—	
	Commissioner for Government Examinations, Madras ..	1
5	Department of Certified Schools and Vigilance Service, Chief Inspector of Certified Schools and Vigilance Service, Madras.	1
6	Medical Department—	
	Director of Medical Services, Madras	2
7	Forest Department—	
	Chief Conservator of Forests	3
	Conservator of Forests	1 for each.
8	Public Works Department—	
	Chief Engineer (Irrigation)	1
	Chief Engineer (Highways)	2
	Superintending Engineer (Highways). Madras Circle ..	1
	Superintending Engineer (Highways) Tiruchirappalli Circle .	1
	Superintending Engineer (Highways), Coimbatore Circle ..	
9	Curator, Madras Record Office	1
10	Connemara Library	1
11	Director of King Institute, Guindy	1
12	Director of Southern Circle, Survey of India, Bangalore ..	1
13	Director of Handlooms, Madras-5	2
14	Asst. Director of Ex-servicemen's welfare, [Ex-official], Madras-17	1

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU WALL MAP—*cont.*	
15	Controller of Stationery and Printing	4
16	Superintendent, Government Museum	1
17	Statistical Department—	
	Director of Statistics	1
18	Officer in-charge, State Information Centre	2
19	Board of Revenue—	
	Commissioner, Settlement of Estates	1
	Director of Settlements	1
	Personal Assistant to Director of Settlements	1
	Secretary, Commercial Taxes	1
	Deputy Director of Survey and Land Records	1
	Assistant Director of Survey and Land Records	1 for each
20	Secretariat—	
	Secretary to Government, Revenue Department	1
	Secretary to Government, Public Works Department ..	1
	Secretary to Government, Agriculture Department	1
	Secretary to Government, Finance Department	1
	Secretary to Government, Public (Rural Development Project) Department.	5
	Secretary to Government, Industries, Labour and Co-operation Department.	1
	Secretary to Government, Law Department	1
	Examiner, Local Fund Accounts, Madras	1
	Secretary, State Legislature Department	8
	Private Secretary to Governor	1
21	Chief Engineer (General), Public Works Department	1
22	Tribunal for Disiplinary Proceedings, Madras ..	1

ANNEXURE I—*cont.*

TAMIL NADU WALL MAP—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU DISTRICT ATLAS.	
1	Revenue-Department—	
	Collectors	1 for each.
	Independent Deputy Tahsildar, Madras	1
2	Town Planning Department—	
	Director of Town-Planning	2
3	Judicial Department—	
	Registrar of High Court	4
	District Judges	1 for each.
	District Magistrates (Judicial)	1 for each
	Administrator-General and Official Trustee	1
	Honorary Director of Legal Studies, Law College	1
4	Animal Husbandry Department—	
	Director of Animal Husbandry	1
	Deputy Director of Animal Husbandry (Livestock)	1
	Deputy Director of Animal Husbandry (Veterinary)	1
	Deputy Director of Animal Husbandry (Key Village Schemes)	1
	Sheep and Goat Development Officer	1
	Veterinary Disease Investigation Officer (Cattle)	1
	Veterinary Disease Investigation Officer (Poultry) ..	1
	Veterinary Disease Investigation Officer, (Sheep and Goat)	1
	Poultry Development Officer, Madras	1
	Superintendent, Institute of Veterinary Preventive Medicine, Ranipet.	1
	Special Officer, Artificial Insemination	1
	District Veterinary Officer, Madras	1
5	Registration Department—	
	Inspector-General of Registration	2
6	Labour Department—	
	Commissioner of Labour	2
	Chief Inspector of Factories	4

ANNEXURE I—*cont.*

TAMIL NADU DISTRCT ATLAS—*cont.*

Serial. number. (1)	*Department and their subordinates.* (2)	*Revised scale for supply.* (3)
7	Agriculture Department—	
	Director of Agriculture	2
	Principal, Agricultural College, Coimbatore	2
8	Local Administration Department—	
	Inspector of Municipal Councils and Local Boards ..	1
	Regional Inspector of Local Boards (two)	1 for each.
9	Industries Department—	
	Director of Industries and Commerce	2
10	Education Department—	
	Director of Public Instruction	2
	Commissioner for Government Examination	1
11	Department of Certified Schools and Vigilance Service—	
	Chief Inspector of Certified Schools and Vigilance Service, Madras.	1
12	Medical Department—	
	Director of Medical Service	2
13	Co-operation Department—	
	Registrar of Co-operative Societies	6
14	Police Department—	
	Inspector-General of Police, Fire Service Branch	1
15	Jail Department—	
	Inspector-General of Prisons	1
16	Forest Department—	
	Chief Conservator of Forests	2
	State Silviculturist, Ootacamund	1
	Conservator of Forest	2 for each.
17	Public Works Department—	
	Chief Engineer (Irrigation)	2
	Chief Engineer (General)	2
	Superintending Engineer, Madras Circle, Public Works Department.	1
	Superintending Engineer, Coimbatore Circle, Public Works Department.	1

ANNEXURE I—*cont.*

TAMIL NADU DISRICT ATLAS—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	Superintending Engineer, Tiruchirappalli Circle, Public Works Department.	1
	Superintending Engineer, Thanjavur Circle, Public Works Department.	1
	Chief Engineer (Highways), Madras-5	2
	Superintending Engineer (Highways), Madras Circle ..	1
	Superintending Engineer (Highways), Tiruchirappalli Circle..	1
	Superintending Engineer (Highways), Coimbatore Circle ..	1
18	Curator, Madras Record Office, Madras-8	1
19	Connemara Library	1
20	Director of Handlooms, Madras	1
21	Director, Southern Circle, Survey of India, Bangalore	1
22	Secretary, Madras Public Service Commission	1
23	Director of King Institute, Guindy	1
24	State Port Officer, Madras	1
25	Asst. Director of Ex-servicemen's welfare, (Ex-officio), Madras-17	1
26	Officer-in-charge, State Information Centre, Madras	3
27	Board of Revenue—	
	Commissioner of Land Revenue	1
	Secretary, Land Revenue	1
	Additional Secretary, Land Revenue	1
	Assistant Secretary, Land Revenue	1
	Assistant Secretary, Irrigation	1
	Board of Revenue Office, Land Revenue Branch	3
	Personal Assistant to the Director of Settlements	1
	Secretary, Commercial Taxes	1
	Deputy Commissioner of Commercial Taxes	1 for each.
	Deputy Director of Survey and Land Records	1
	Assistant Director of Survey and Land Records	1 for each.
	Commissioner settlement of Estates	1
	Director of Settlements	1

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU DISTRICT ATLAS—*cont.*	
28	Statistical Department—	
	Director of Statistics	2
29	Secretariat—	
	Secretary to Government, Home Department	8
	Secretary to Government, Revenue Department ..	2
	Secretary to Government, Public Works Department ..	20
	Secretary to Government, Agriculture Department	2
	Secretary to Government, Health, Education and Local Administration Department.	1
	Examiner, Local Fund Accounts	1
	Secretary to Government, Industries, Labour and Co-operation	1
	Public (Elections) Department	8
	Director of Women's Welfare	1
	Public (Information and Publicity) Department	1
	Additional Secretary, Public (Rural Development Projects) Department.	5
	Public (Publicity and Development) Department	1
	Secretary, State Legislature Department	3
30	Protector of Emigrants, Nagapattinam	2
	Protector of Emigrants, Dhanushkodi	1
31	Private Secretary to the Governor	1
32	Superintendent, Institute of Veterinary Preventive Medicine, Ranipet.	1
33	Special Officer Artificial Insemination	1
34	District Veterinary Officer, Madras	1
35	Tribunal for Disciplinary Proceedings, Madras	1

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU ROAD MAP.	
1	Town-Planning Department—	
	Director of Town-Planning	2
2	Judicial Department—	
	Registrar, High Court	1
	District Judges	1 for each.
	District Magistrates (Judicial)	1 for each
	Subdivisional Magistrates	1 for each.
	Administrator-General and Official Trustee	1
	Honorary Director of Legal Studies, Law College	1
3	Animal Husbandry Department—	
	Director of Animal Husbandry	1
	Deputy Director of Animal Husbandry (Live stock) ..	1
	Deputy Director of Animal Husbandry (Veterinary) ..	1
	Deputy Director of Animal Husbandry (Key Village Schemes)	1
	Sheep and Goat Development Officer, Madras	1
	Veterinary Disease Investigation Officer (Cattle)	1
	Veterinary Disease Investigation Officer (Sheep and Goat) ..	1
	Veterinary Diseases Investigation Officer (Poultry)	1
	Poultry Development Officer, Madras	1
	Special Officer, Artificial Insemination	1
	District Veterinary Officer, Madras	1
4	Registration Department—	
	Inspector-General of Registration	2
6	Labour Department—	
	Commissioner of Labour	2
	Chief Inspector of Factories	2

ANNEXURE I—*contd.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU ROAD MAP—*cont.*	
6	Agriculture Department—	..
	Director of Agriculture	7 For use and for distribution to Joint Director of Agriculture, Madras.
	State Marketing Officer	1
	Deputy Director of Agriculture, Coimbatore	1
	Deputy Director of Agriculture, Thanjavur	1
	Deputy Director of Agriculture, Madurai	1
	Deputy Director of Agriculture, Madras	1
	Assistant Marketing Officer, Cuddalore	1
	Principal, Agricultural College, Coimbatore	2
	Assistant Marketing Officer, Madurai	1
	Cotton Specialist, Coimbatore	1
	Millet and Pulses Specialist, Coimbatore	1
	Paddy Specialist, Coimbatore	1
	Oil Seeds Specialist, Coimbatore	1
	Horticulturist and Professor of Horticulture, Coimbatore ..	1
7	Local Administration Department	
	Inspector of Local Boards	2
	Regional Inspector of Local Boards (two)	1 for each.
8	Industries Department—	
	Director, Industries and Commerce	6
9	Education Department	
	Director of Public Instructions	2
	Commissioner for Government Examinations	1
10	Department of Certified Schools and Vigilance Service—	
	Chief Inspector of Certified Schools and Vigilance Service, Madras.	1

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU ROAD MAP—*cont.*	
11	Co-operation Department—	
	Registrar of Co-operative Societies	6
12	Police Department—	
	Inspector-General of Police, Fire Services Branch	1
13	Jail Department—	
	Inspector-General of Prisons	1
14	Forest Department—	
	Chief Conservator of Forests	1
	State Silviculturist	1
	Conservator of Forests	1 for each.
	Forest Utilisation Officer	1
15	Public Works Department—	
	Chief Engineer (Irrigation)	1
	Chief Engineer (General)	1
	Chief Engineer (Highways)	2
	Superintending Engineer, Madras Circle	1
	Superintending Engineer, Tiruchirappalli Circle	5
	Superintending Engineer, Thanjavur Circle	6
	Superintending Engineer, Coimbatore Circle	1
	Superintending Engineer, Highways, Madras Circle	1
	Superintending Engineer, Highways Tiruchirappalli Circle ..	1
	Superintending Engineer, Highways, Coimbatore Circle ..	1
16	Assistant Director of Ex-Servicemen's Welfare (Ex-officio) Madras-17.	1
17	Officer-in-charge, State Information Centre, Madras	3
18	Director of Handlooms, Madras	1
19	Connemara Library	1
20	Director, Southern Circle, Survey of India, Bangalore ..	1
21	Director of King Institute, Guindy	1
22	Secretary, Madras Public Service Commission	1
23	State Port Officer, Madras	1
24	Director of Harijan Welfare	1
25	Secretary, State Transport Authority, Madras	6

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU ROAD MAP—*cont.*	
26	Regional Transport Officers and Subordinates	42 (*Vide* Annexure XIII)
27	Superintendent, Government Museum, Egmore..	1
28	Board of Revenue—	
	Commissioner, Land Revenue	1
	Secretary, Land Revenue	1
	Additional Secretary, Land Revenue	1
	Board of Revenue Office, Land Revenue Branch	3
	Commissioner, Settlement of Estates	1
	Director of Settlements	1
	Personal Assistant to Director of Settlements	1
	Secretary, Commercial Taxes	1
	Deputy Commissioner of Commercial Taxes	1
	Deputy Director of Survey and Land Records	1
29	Secretariat—	
	Secretary to Government, Public Works Department ..	7
	Secretary to Government, Health, Education and Local Administration Department.	1
	Secretary to Government, Finance Department	1
	Examiner, Local Funds Accounts	1
	Assistant Examiner, Temple Audit	1
	Assistant Examiner, Local Funds Accounts, Salem	1
	Assistant Examiner, Local Funds Accounts, Tiruchirappalli	1
	Secretary to Government, Industries, Labour and Co-operation Department.	1
	Secretary to Government, Public Elections Department ..	2 sets.
	Private Secretary to the Governor	1
	Comptroller, Governor's Household	4 sets.
	Governor	1
	Ministers	1
	Director of Women's Welfare	1 set.
	Public (Information and Publicity) Department	1 set.

ANNEXURE I—*contd.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TAMIL NADU ROAD MAP—*cont.*	
	Secretariat—*cont.*	
	Additional Secretary, Public (Rural Development Project) Department.	5 sets.
	Public (Publicity and Development) Department	1
	Director of Statistics	1
	Secretary, State Legislature Department	2
	Tribunal for Disciplinary Proceedings, Madras	1
	DISTRICT TOURING MAPS.	
1	Revenue Department—	
	Each Collector for Personal use	1
	Each Collector for Reserve	6*
		*To meet the requirements of temporary Officers and Offices
	Revenue Divisional Officer	1 for each.
	District Surveyor	1
2	Town-Planning Department—	
	Director, Town-Planning	1 set.
	Joint Director of Town-Planning	1 set.
	Judicial Department—	
	Registrar, High Court	1 set.
	District Judges	1 for each district under jurisdiction of each
	District Magistrates (Judicial)	1 for each district under jurisdiction of each.
	Sub-Judges	1 Do.
	Subdivisional Magistrates	1 Do
	Administrator-General and Official Trustee of Madras ..	1 set
4	Animal Husbandry Department—	
	Director of Animal Husbandry	1 set
	Deputy Director of Animal Husbandry (Veterinary) ..	1 Do.

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	DISTRICT TOURING MAPS—*cont.*	
	Animal Husbandary Department—*cont.*	
	Deputy Director of Animal Husbandry (Livestock)	1 Set.
	Deputy Director of Animal Husbandry (Key Village Schemes)	1 Do.
	Sheep and Goat Development Officer	1 Do.
	Veterinary Disease Investigation Officer (Sheep and Goat) ..	1 Do.
	Veterinary Disease Investigation Officer (Cattle) ..	1 Do.
	Veterinary Disease Investigation Officer (Poultry) ..	1 Do.
	Poultry Development Officer	1 Do.
	Special Officer, Artificial Insemination	1 Do.
	District Veterinary Officers	1 for each (*vide* Annexure II).
	Special Officers	1 copy of the district under jurisdiction of each (*vide* Annexure II).
5	Registration Department—	
	Inspector-General of Registration	2 sets
	District Registrars	2 of each district under jurisdiction.
6	Labour Department-	
	Commissioner of Labour	2 sets
	Chief Inspector of Factories	2 sets.
	Inspector of Newspaper Establishments, Madras.	1 set.
7	Agriculture Department—Director of Agriculture, Madras.	7 sets.
	State Marketing Officer	1 set.
	Deputy Director of Agriculture	1 of each district under jurisdiction (*vide* Annexure IV).
	District Agricultural Officer	1 Do.
	Special Officers	1 Do.

ANNEXURE I—*cont.*

Serial number. (1)	*Department and their subordinates.* (2)	*Revised scale for supply.* (3)
	DISTRICT TOURING MAPS—*cont.*	
8	Local Administration Department—	
	Inspector of Local Boards	2 sets.
	Regional Inspector of Local Boards (II) ..	1 of each district under jurisdiction.
	District Panchayat Officers	1 Do.
	Additional District Panchayat Officers ..	1 for each district under jurisdiction.
	Deputy Panchayat Officer, Nilgiris	1 Nilgiris district.
	Engineering Supervisor	1 for each district under jurisdiction.
9	Industries Department—	
	Director of Industries and Commerce ..	7 sets.
	Assistant Director of Industries and Commerce (14).	1 in each district under jurisdiction (*vide* Annexure VI).
	Assistant Directors of Fisheries (8)-	Do.
	Director of Cinchona	2 sets.
10	Educational Department—	
	Director of Public Instructions	4 to 8 sets.
	Divisional Inspector of Schools	1 in each district under jurisdiction (*vide* Annexure VII).
	Basic Educational Officer	1 Do.
	District Educational Officers..	1 Do.
	Inspectors of Girls Schools(5)	1 Do.
	Inspector of Anglo-Indian Schools	1 set.
	Inspector of Oriental Schools	1 set.
	Chief Inspector of Physical Education ..	1 set.
	Women Specialist in Physical Education, Madras.	1 set.
	Commissioner for Government Examinations	1 set.
10	Medical Department—	
	District Medical Officer	1 copy of the district under jurisdiction of each.

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply*
(1)	(2)	(3)
	DISTRICT TOURING MAPS—cont.	
12	Co-operation Department—	
	Registrar of Co-operative Societies	8 sets.
13	Police Department—	
	Inspector-General of Police, Fire Service Branch and for distribution to the subordinate Officers.	2 to 7 (*vide* Annexure VIII).
	Police Officers	1 for each (*vide* Annexure VIII).
14	Forest Department—	
	Chief Conservator of Forests	2 sets.
	State Silviculturist	2 sets.
	Conservator of Forests	2 of each district under jurisdiction (*vide* Annexure X).
	District Forest Officers	2 of each district under jurisdiction (*vide* Annexure X).
15	Public Works Department—	
	Chief Engineer (Irrigation)	2 sets.
	Chief Engineer (General)	2 sets.
	Superintending Engineer Public Works Department.	4 to 26 sets under jurisdiction of each (*vide* Annexure XI).
	Chief Engineer (Highways)	8 sets
	Superintending Engineer Highways and for distribution to Divisional Engineers	6 to 15 under jurisdiction of each *vide* Annexure XI).
	Divisional Engineer, Highways, Designs, Madras.	1 set.
	Director of Research Highways, Madras	1 set.
	Radio Engineer, Madras-5	1 copy of Kanyakumari district only.
	Assistant Radio Engineer Madurai .. 1	Do.
16	Directroate of Ex-Servicemen's Welfare 1	
	Assistant Director of Ex-Service men's welfare, District Soldiers', Sailors' and Airmen's Board.	1 for each under jurisdiction of each (*vide* Annexure XIV).

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	DISTRICT TOURING MAPS—*cont*	
17.	Hindu Religious and Charitable Endowments Department—	
	Commissioner, Hindu Religious and Charitable Endowment (Administration) Department.	2 sets.
	Deputy Commissioner, Hindu Religious and Charitable Endowment (Administration) Department.	1 copy in each district under jurisdiction of each (*vide* Annexure XV).
	Verification Officer, Madras	1 set.
	Assistant Commissioners, Hindu Religious and Charitable Endowment.	1 copy in each of the district under jurisdiction (*vide* Annexure XV).
18.	Officer-in-charge, State Information Centre, Madras.	3 sets.
19.	Director of Handlooms, Madras	1 set.
20.	Curator, Madras Record Office	1 set.
21.	Director, Southern Circle Survey of India, Bangalore.	1 set.
22.	Director of King Institute, Guindy	1 set.
23.	State Port Officer	1 set of each of the Marine districts only as shown in the Annexure XII.
24.	Director of Harijan Welfare	1 set
25.	Secretary, State Transport Authority	3 sets
26.	Regional Transport Officers and Subordinates.	1 to 9 sets (*vide* Annexure XIII).
27.	Director of Museum, Egmore	1set
28.	Director of Statistics	4sets
29.	Secretary, State Legislature Department	2 sets
30.	Board of Revenue—	
	Commissioner, Land Revenue	1 set.
	Secretary, Land Revenue	1 set.
	Additional Secretary, Land Revenue	1 set.
	Board of Revenue Office (Land Revenue) ..	3 sets.

ANNEXURE I—*cont*.

Serial number	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	DISTRICT TOURING MAPS—*cont*.	
	Board of Revenue—*cont*.	
	Commissioner Settlement of Estates ..	1 set
	Director of Settlements	1 set
	Personal Assistant to Director of Settlements.	1 set.
	Settlement Officers	1 copy of each district under jurisdiction of each.
	Assistant Settlement Officers	Do.
	Secretary, Commercial Taxes	1 set.
	Board of Revenue, Commercial Taxes Branch	1 set.
	Deputy Commissioner of Commercial Taxes ..	1 copy in each under jurisdiction of each
	Commercial Tax Officer	1 Do.
	Deputy Commercial Tax Officer	1 Do.
	Assistant Commercial Tax Officer	1 Do.
	Deputy Director of Survey and Land Records	1 set.
	Assistant Director of Survey and Land Records	2 copy under jurisdiction of each.
	Officer-in-charge, Survey Parties	Do.
31.	Secretariat—	
	Secretary to Government, Revenue Department	4
	Secretary to Government, Public Works ..	6
	Secretary to Government, Agriculture Department.	1 set.
	Secretary to Government, Health, Education and Local Administration Department.	1 set.
	Secretary to Government, Industries Labour and Co-operation Department.	1 set.
	Examiner, Local Funds Accounts, Madras ..	1 set.
	Assistant Examiner, Temple Audits	1 set.
	Assistant Examiner Local Funds Accounts, Salem.	1 copy of North Arcot, Salem, Coimbatore and Nilgiris Districts.
	Assistant Examiner, Local Fund Accounts, Tiruchirappalli.	1 in each of South Arcot Tiruchirappalli and Chengalpattu
	Assistant Examiner, Local Funds, Madurai ..	1 in each of Ramanathapuram, Tirunelveli, Madurai and Kanyakumari districts.

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised Scale for supply.*
(1)	(2)	(3)
District Touring Maps—cont.		
Secretariat—*cont*		
	Private Secretary to the Governor	1 set.
	Secretary to Government, Public Elections Department.	2 sets.
	Director of Women's Welfare	1 set.
	Additional Secretary to Government, Public (Rural Development Projects) Department.	5 sets.
	Public (Planning and Development) Department.	1 set.
	Public (Rural Development Projects IV) Department.	1 set.
	Ministers	1 set for each.
	Tribunal for disciplinary proceedings, Madras.	1 set.
	TALUK MAPS.	
1.	Revenue Department—	
	Each Collector	12
	Revenue Divisional Officer	12
	Tahsildar	12
	District Surveyor	12
	Deputy Tahsildar	12
	Minor Irrigation Overseer	12
	Each Collector for Reserve	9
2.	Town-Planning Department—	
	Director of Town-Planning .. .. .. 2 sets.	For each Taluk
	Joint Director of Town Planning .. .. 1 set	For each Taluk
3.	Judicial Department—	
	Registrar of High Court	1 set.
	District Judges	one for each taluk under jurisdiction of each.
	District Magistrates (Judicial)	1 Do.
	Sub-Judges	1 Do.
	District Munsifs	1 Do.
	Sub-divisional Magistrates	1 Do.
	Sub-Magistrates and Additional First class Magistrates.	1 Do.

ANNEXURE I—*cont.*

Serial number. (1)	*Department and their subordinates* (2)	*Revised scale for supply.* (3)
	TALUK MAPS—*cont*,	
4.	Animal Husbandry Department—	
	Director of Animal Husbandry	1 set.
	District Veterinary Officers	one of each taluk under jurisdiction of each (*vide* Annexure II).
	Special Officers	1 Do.
5.	Registration Department—	
	District Registrars (16)	one for each taluk under jurisdiction.
	District Registrars for issue to Sub-Registrars.	1 Do.
6	Labour Department—	
	Commissioner of Labour	2 sets.
	Chief Inspector of Factories	1 set.
	Assistant Inspectors of Labour	1 in each of the taluks under jurisdiction (vide Annexure III-B.)
7	Agriculture Department—	
	Director of Agriculture	1 set.
	State Marketing Officer	1 Do.
	District Agricultural Officer	1 of taluk under jurisdiction (vide Annexure IV).
	Special Officers	1 Do.
	Local Administration Department—	
	Inspector of Local Boards	2 sets.
	Regional Inspector of Local Boards (two) ..	1 of taluk under jurisdiction of each.
	District Panchayat Officers	1 Do.
	Additional District Panchayat Officers ..	1 Do.
	Deputy Panchayat Officers	1 Do.
	Engineering Supervisors	1 Do.

ANNEXURE I—*cont*.

Serial number. (1)	*Department and their subordinates.* (2)	*Revised scale for supply.* (3)
	TALUK MAPS—*cont*,	
9	Industries Department—	
	Director of Industries and commerce	1 Set,
	Assistant Director of Industries and Commerce (14).	1 in each taluk under-jurisdiction (vide Annexure VI).
	Assistant Directors of Fisheries (8)	1 Do.
	Director of Cinchona, Ootacamund ..	2 copies in each of the taluks of Nilgiris and Coimbatore districts.
	Cinchona Propagation Superintendent ..	1 Do.
	Superintendent, Cinchona Plantation, Anamallais.	1 copy in each of the taluks of Coimbatore district,
	Superintendent Cinchona Plantation, Naduvattam.	1 copy in each of the taluk.
10	Education Department—	
	Director of Public Instructions	4 to 8 sets.
	Divisional Inspector of Schools	1 in each taluk under jurisdiction (vide Annexure VII).
	Basic Educational Officer	1 Do.
	District Educational Officer	1 to 6 copies in each taluk under jurisdiction (vide Annexure VII).
	Inspectresses of Girls' Schools	16 in each taluk under jurisdiction (vide Annexure VII).
11	Medical Department—	
	District Medical Officer	1 in each taluk under jurisdiction.
12	Co-operative Department—	
	Registrar of Co-operative Societies	3 sets.
13	Police Department—	
	Police Officers	3 to 10 (vide Annexure VIII).
14	Jail Department—	
	Inspector-General of Prisons	1 set.

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TALUK MAPS—*cont.*	
15	Forest Department—	
	District Forest Officer (for distribution to Range Officers).	2 in each taluk under jurisdiction (vide Annexure X).
	Public Works Department—	
	Chief Engineer (Irrigation)	1 set.
	Chief Engineer (General)	Do.
	Superintending Engineer, Public Works Department.	4 to 25 sets under jurisdiction of each (vide Annexure XI).
	Chief Engineer, Highways	2 sets.
	Superintending Engineer, Highways	3 to 12 sets under jurisdiction of each (vide Annexure XI).
17	Officer-in-charge, State Information Centre, Madras.	3 sets.
18	Hindu Religious and Charitable Endowments—Department—	
	Assistant Commissioners, Hindu Religious and Charitable Endowments (Administration) Department.	2 copies in each taluk under jurisdiction of each (vide Annexure XV).
19	Director of Handlooms, Madras	1 copy of Pollachi taluk-map.
20	Director, Southern Circle, Survey of India, Bangalore.	1 set.
21	Director of Harijan Welfare	1 Do.
22	Secretary, State Transport Authority	2 sets.
23	Regional Transport Officers	1 in each taluk under jurisdiction of each (vide Annexure XIII).
24	Director of Statistics	4 sets

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	TALUK MAPS—*cont.*	
25	Board of Revenue—	
	Commissioner, Land Revenue	1 set.
	Board of Revenue Office, Land Revenue ..	3 sets.
	Commissioner, Settlement of Estates ..	1 set.
	Director of Settlements	1 Do.
	Personal Assistant to Director of Settlements.	1 Do.
	Settlement Officers	1 copy of each taluk under jurisdiction of each.
	Assistant Settlement Officers	1 do.
	Secretary Commercial Taxes	1 set.
	Board of Revenue, Commercial Taxes branch.	1 do.
	Deputy Commissioner of Commercial Taxes.	1 copy under jurisdiction of each.
	Commercial Tax Officer	1 Do.
	Deputy Commercial Tax Officer	1 copy under jurisdiction of each.
	Assistant Commercial Tax Officer	1 Do.
	Assistant Director of Survey and Land Records.	2 copies under jurisdiction.
	Officer-in-charge, Survey parties	2 Do.
26	Secretariat—	
	Secretary to Government Revenue Department.	2
	Secretary to Government Public Works Department ..	3
	Secretary to Government Health, Education and Local Administration Department.	1 set.
	Secretary to Government Public (Elections) Department	2 sets.
	Director of Women's Welfare	1 set.
	Government Pleader	1 Do.
	State Prosecutor	1 Do.
	Secretary, State Legislature Department ..	1 set.

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply*
(1)	(2)	(3)
	TOWN MAPS (OTHER THAN MADRAS CITY).	
1	Collector	1
2	Revenue Divisional Officer	1
3	Reserve with Collectors	10
4	Tahsildar	1
5	Municipal Councils for the use of Chairman, Subordinates and reserve.	21
6	Town Surveyor	1
7	Director of Town Planning	2
7/A	Joint Director of Town Planning	1
8	District judge	1 of towns in the jurisdiction.
9	District Registrars	1 of each town under jurisdiction.
10	Sub-Registrars	1 Do.
11	Director of Public Health	1
12	Assistant Inspector of Labour	1 for each under jurisdiction (vide Annexure III).
13	District Agricultural Officer, Madurai ..	1 Madurai town.
14	Special District Agricultural Officer, Crop Sampling, Madurai.	1 Do.
15	District Agricultural Officer	1 Coimbatore town.
16	Inspector-General of Police, Fire Service Branch, for distribution to Subordinate Officers.	2 sets.
17	Chief Engineer, Highways	2
18	Chief Engineer, Irrigation	1
19	Chief Engineer (General)	1
20	Superintending Engineers (irrigation)	1 to 7 under jurisdiction. (vide Annexure XI)
21	Superintending Engineer (Highways) ..	2 under jurisdiction (vide Annexure XI).
22	Director, Southern Circle, Survey of India, Bangalore.	1
23	Director of King Institute, Guindy	1
24	State Port Officer	1 of each town in which minor port is situated (vide Annexure XII).

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	Town Maps other than Madras City—*cont.*	
25	Board of Revenue Office, Land Revenue Branch.	3 sets.
26	Commissioner Settlements, of Estates	1
27	Director of Survey and Settlements	1
28	Personal Assistant to Director of Settlements.	1
29	Secretary, Commercial Taxes	1
30	Deputy and Assistant Commercial Tax Officers	1 for each.
31	Secretary to Government, Public Works Department.	1
32	Secretary to Government, Health, Education and Local Administration Department.	2 sets. (supply deferred).
33	Additional Secretary to Government, Public (Rural Development Projects) Department.	1 set.
34	Officer-in-charge, Information Centre, Madras.	3 sets.
	WARD MAP OF TOWNS.	
1	Collector	1 + 4
2	Town Surveyor	1
3	Municipal Councils for use of Chairman, subordinates and supply to sanitary Engineer.	8
4	Director of Town Planning	2
5	Sub-Registrars	1
6	Chief Engineer, Highways, Madras	1 set.
7	Director of Women's, Welfare	1
8	Superintending Engineer, Thanjavur Circle ..	3 copies in each of Thanjavur town, 1 in each of Kumbakonam town, 2 copies in each of Mayuram town.
9	Secretary to Government, Public (Rural Development Projects) Department.	2 sets. (Supply deferred).

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	REVENUE BLOCK MAP (TOWNS).	
1	Town Surveyor for use in Field and for reserve.	2
2	Municipal Councils for use of Chairman and subordinate officers.	1
3	Tahsildar	1
4	Karnams (complete set to be divided among the various Karnams according to the charges).	1
5	Secretary to Government, Health, Education and Local Administration Department	1
6	Director of Town-Planning	2
7	Sub-Registrar	1
8	Revenue Inspector	1 under jurisdiction.
9	Town Surveyor for reserve and sale	10
10	Secretary to Government, Public (Rural Development Projects) Department.	2 sets.
	RECORD OF MEASUREMENT (TOWNS).	
1	Town Surveyor for maintenance.	3
2	Municipal Councils for use of Chairman and subordinates)	1
3	Tahsildar	1
4	Karnams	1
5	Secretary to Government, Public (Rural Development Projects) Department.	2 sets. [Supply de;erred]
	PANCHAYAT MAP.	
1	President, District Board	1
2	Tahsildar	1
3	Union President for maintenance	1
4	Union President for reserve	1
5	Director of Town- Planning	1
6	Chief Engineer, Highways, Madras	1 set
7	Additional Secretary to Government, Public (Rural Development) Projects Department.	2 sets.
8	Joint Diiector of Town Planning	1 sct

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	I.P. PRINT OF STREET FIELD ATLAS FOR PANCHAYATS.	
1	Divisional Engineer, Highways	1
2	President, Panchayat Board	2
	VILLAGE MAP.	
1	Collector	1
2	Collector for Reserve	10
3	Revenue Divisional Officer	1
4	Tahsildar	1
5	District Surveyor	1
6	Independent Deputy Tahsildar, Madras ..	1* *One copy in each of Perambur, Arumbakkam, Vada Agaram, Saligramam to the Independent Deputy Tahsildar, Madras City.
7	Deputy Tahsildars	1
8	Revenue Inspector	1
9	Karnam	2
10	Sale at Taluk Office	6
11	District Judge	1 of village under jurisdiction of each.
12	District Munsif	1 Do.
13	Sub-Judge	1 Do.
14	District Magistrates	1 of village under jurisdiction of each.
15	Subdivisional Magistrates	1 Do.
16	Overseer, Public Works Department	1 Do.
17	District Forest Officers	2 of village maps that by order on Revenue forest under the jurisdiction of each (*vide* Annexure X).
18	Superintending Engineer, Public Works Department.	1 to 3 of each village under jurisdiction (*vide* Annexure XI).
19	Executive Engineer, Public Works Department.	1
20	Superintending Engineer, Highways	2 copies in each under jurisdiction (vide Annexure XI).

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	VILLAGE MAPS—*cont.*	
21	Divisional Engineer, Highways	1 copy in each under jurisdiction (*vide* Annexure XI).
22	Board of Revenue Office (Land Revenue Branch)	1 set.
23	Settlement Officers	1 copy of each village other than ryotwari villages under jurisdiction of each.
24	Assistant Settlement Officers	1 copy of each village other than ryotwari villages under jurisdiction of each.
25	Port Officer	1 of each village wherein minor port is situated (*vide* Annexure XII).
26	Secretary to Government, Public (Rural Development Projects Department).	2 sets. (supply deferred)
27	Officer-in-charge, State Information Centre, Madras.	3 sets (supply deferred)
28	Joint Director of Town planning	1 of each village of all Districts

CITY MAP OF MADRAS

Serial number.	*Department and their subordinate.*	3·3″ *1 mile.*	5″ *1 mile.*	10″ *1 mile.*
1	Collector	1	1	1
2	Tahsildar (North Range)	1	1	1
3	Tahsildar (South Range)	1	Nil.	Nil.
4	Independent Deputy Tahsildar	4	..	..
5	District Surveyor	2	2	2
6	Registrar of High Court	7*	..	..
		* 1 for his use and 6 for distribution to the Judges of the Subordinate Courts in Madras City.		
7	Administrator-General and Official Trustee..	1	1	..
8	Honorary Director of Legal Studies, Law College.	1	..	..
9	Director of Animal Husbandry	1	1	1
10	Deputy Director of Animal Husbandry (Veterinary).	1	1	1

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply*		
		3·3″ 1 mile.	5″ 1 mile	10″ 1 mile.
(1)	(2)	(3)		
	MAP OF MADAS CITY—*cont.*			
11	Deputy Director of Animal Husbandry (Live-stock).	1	1	1
12	Deputy Director of Animal Husbandry (Key Village Scheme.)	1	1	1
13	Sheep and Goat Development Officer	1	1	1
14	Poultry Development Officer, Madras	1	1	1
15	Principal, Madras Veterinary College	1	1	1
16	District Veterinary Officer, Madras	1	1	1
17	Inspector-General of Registration	1	1	1
18	Commissioner of Labour	1	1	1
19	Labour Officer, Madras-1	1	..	..
20	Labour Officer, Madras-2	1	..	..
21	Chief Inspector of Factories	1	..	..
22	Regional Inspector of Factories, Madras ..	1	1	1
23	Inspectors of Factories, Madras-2	1 For each (*vide* Annexure III B).	..	..
24	Assistant Inspectors of Labour (4)	1 For each (*vide* Annexure III B).	..	..
25	District Agricultural Officer, Guindy	7	..	..
26	Assistant Agricultural Engineer (C.A.E.S.), Madras.	1	..	..
27	Director of Industries and Commerce ..	2	2	2
28	Assistant Director of Industries and Commerce (2).	.. For each,	..	1
29	Assistant Director of Fisheries, Vellore ..	..	..	1
30	Assistant, Director of Fisheries, Madras ..	..	..	1
31	Industrial Engineer	..	..	1
32	District Educational Officer, Madras	7	7	7
33	Women Specialist in Physical Education ..	..	..	1
34	Chief Inspector of Physical Education ..	..	..	1
35	Commissioner for Government Examinations	1	..	..
36	Chief Inspector of Certified Schools and Vigilance Service, Madras.	1	..	..

ANNEXURE I—*cont.*

Serial number.	*Department and their subordinates.*	*Revised scale for supply.*		
(1)	(2)	(3)		
	MAP OF MADRAS CITY—*cont.*			
37	Director of Medical Services	2	..	..
38	Inspector-General of Police (Fire Services Branch) for Distribution of Subordinate Officers.	12	..	..
39	Chief conservator of Forests	2	..	..
40	Chief Engineer (Irrigation) including Special Chief Engineer (Irrigation).	1	7	..
41	Chief Engineer, General	1	1	..
42	Chief Engineer, Highways	2	8	2
43	Superintending Engineer, Highways, Madras Circle.	2	3	2
44	Divisional Engineer, Highways, Chengalpattu Division.	2	3	2
45	Deputy Director of Fisheries, Madras	1	1	1
46	Superintending Engineer, Public Works Department, Madras Circle.	11	..	..
47	Director, Southern Circle, Survey of India, Bangalore.	1	..	..
48	Secretary, Tamil Nadu Public Service Commission.	1	..	..
49	Commissioner of Corporation for issue and reserve.	75	75	75
50	Secretary State Transport Authority	2	..	..
51	Regional Transport Officer, Chengalpattu ..	1	..	..
52	Controller of Stationery and Printing	3	..	..
53	Superintendent, Government Museum, Egmore.	1	..	..
54	Secretary, Commercial Taxes	..	..	1
55	Commercial Tax Officer, Deputy Commercial Tax Officer and Assistant Commercial Tax Officer.	1 for each.	..	..
56	Secretary to Government, Health, Education and Local Administration Department.	1	1	1
57	Secretary to Government, Industries, Labour and Co-operation Department.	1	1	1
58	Secretary to Government, Law Department ..	1	1	1
59	Private Secretary to Governor	1	1	1
60	Director of Women's Welfare	..	..	..
61	Additional Secretary, Rural Development Projects Department.	2	..	..
62	Public (Planning and Development) Department.	..	..	1
63	Divisional Inspector of Schools, Madurai ..	1	..	..
64	Inspectress of Girls' Schools, Madras	1	..	..

ANNEXURE I—*cont.*

Serial number.	*Department and their Subordinates.*	*Revised scale for supply*		
(1)	(2)	(3)		
		3·3″ 1 mile	5″ 1 mile	10″ 1 mile.
	MAP OF MADRAS CITY—*cont.*			
65	Secretary, State Legislature Department ..	4	..	..
66	Director of Town-Planning	..	..	1
67	Joint Director of Town Planning	1	1	1
68	Special District Agricultural Officer, Crop Sampling, Vellore.	1	..	..
69	Basic Educational Officer, Madurai	1	..	2
70	Director of Statistics	2	2	2
71	Officer-in-charge, State Information Centre, Madras.	3	..	..
72	Assistant Commissioner, Hindu Religious and Charitable Endowments, Madras.	3	..	..
73	Radio Engineer, Madras-5	1	..	..
74	Assistant Radio Engineer, Vellore	1	..	..
75	Assistant Director Survey and Land Records, Coimbatore.	2	..	.
76	Tribunal for disciplinary proceedings, Madras	1	..	.
77	Special Officer, Urban Land Tax, Madras 1	1	..	.

DIVISION MAP OF MADRAS CITY.

1	Collector	1
2	Tahsildar (South Range)	1 copy in each of Purasawalkam, Perambur George town and Tondiarpet.
3	Revenue Inspector	1
4	Independent Deputy Tahsildar	1 set.
5	Head Surveyor	2 sets.
6	Town Surveyor	1 for each under jurisdiction.
7	Honorary Director of Legal Studies, Law College.	1
8	Inspector-General of Registration	1
9	Director of Town Planning	1
10	Chief Inspector of Certified Schools and Vigilance Service, Madras.	1
11	Inspector-General of Police, Fire Services Branch for distribution to subordinate Officers.	2
12	Chief Engineer, Highways	1

ANNEXURE I—*Contd.*

Serial number,	*department and their subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	DIVISION MAP OF MADRAS CITY—cont.	
13	Superintending Engineer, Highways Madras Circle.	1
14	Divisional Engineer, Highways Chengalpattu ..	1
15	Commissioner, Corporation of Madras ..	10
16	Controller of Stationery and Printing ..	3
17	Secretary, Commercial Taxes	1
18	Assistant Commercial Tax Officer	1 copy under jurisdiction
19	Secretary to Government, Finance Department.	1
20	Secretary to Government, Industries Labour and Co-operation Department.	1
21	Director of Statistics	2
22	Officer-in-charge, State Information Centre, Madras.	3 sets.
23	Assistant Director of Ex-Servicemen's welfare, (Ex-officio), Madras-17	1 set.
	REVENUE BLOCK MAP OF MADRAS CITY.	
1	Collector	1
2	Tahsildar	2
3	For maintenance in Taluk Office	2
4	Inspector-General of Registration	1
5	Town Surveyor	2
6	Chief Engineer, Highways	1
7	Deputy Surveyor	1 for each.
8	Director of Town-Planning	1
9	Superintending Engineer, Highways, Madras Circle	1
10	Superintending Engineer, Public Works Department, Madras Circle.	5
11	Divisional Engineer, Highways and rural works Madras.	1
12	Engineer and Head Surveyor Corporation of Madras.	5
13	Commissioner, Corporation of Madras	4
14	Controller of Stationery and Printing	3
15	Secretary to Government, Industries and Labour Departmen	1

ANNEXURE I—*cont.*

Serial number.	*Department and thier subordinates.*	*Revised scale for supply.*
(1)	(2)	(3)
	REVENUE BLOCK MAP OF MADRAS CITY—*cont.*	
16	Director of Statistics	2 sets.
17	Special officer, Urban Land Tax, Madras, ..	2 sets.
18	Director of Settlements	1
19	Secretary, Board of Revenue (LR)	1
20	Deputy Director of Survey and Land Records	1
	I.P. PRINTS OF RECORD OF MEASUREMENTS OF MADRAS CITY.	
1	Collector	1
2	Tahsildar	1
3	For maintenance in Tahsildar's office	2
4	Head Surveyor	2
5	Revenue Inspector	1 for each under jurisdiction.
6	Town Surveyor	1 for each. Do.
7	Director of Town Planning	3
	INDEX TO BLOCK MAPS OF DIVISIONS (MADRAS CITY).	
1	Collector	1
2	Tahsildar (North Range)	2 in each of Purasawalkam, Perambur, Georgetown, and Tondiarpet Divisions.
3	Tahsildar (South Range)	2 in each of Triplicane, Mambalam, Vepery, Mylapore, Nungambakkam, Egmore and Chintadripet.

ANNEXURE II

Tamil Nadu District Atlas.

ANIMAL HUSBANDARY DEPARTMENT.

Director of Animal Husbandary	One copy each
Deputy Director of Animal Husbandary (Veterinary)	Do.
Deputy Director of Animal Husbandary (Livestock)	Do.
Deputy Director of Animal Husdandary (Key Villege Schemes).	Do.
Sheep and Goat Development Officer	Do.
Veterinary Disease investigation Officer(Cattle)	Do.
Veterinary Disease Invetigation Officer (Sheep and Goat)	Do.
Veterinary [illegible]isease investigation Officer (poultry)	Do.
poultry Development Officer, Madras	Do.
Superintendent, Institute of Veterinary preventive Medicines.	Do.
Special Officer, Artificial insemination	Do.
District Veterinary Officer, Madras	Do.

2. TAMIL NADU ROAD MAP

Director of Animal Husbandary	One copy each
Deputy Director of Animal Husbandary (Veterinary)	Do.
Deputy Director of Animal Husbandary (Livestock)	Do.
Deputy Director of Animal Husbandary (Key Village of Schemes).	Do.
Sheep and Goat Development Officer	Do.
Veterinary Disease Investigation Offieer (Cattle)	Do.
Veterinary Disease investigation Officer (Sheep and Goat).	Do.
Veterinary Disease investigation Officer (poultry)	Do.
Poultry Development Officer, Madras	Do.
Special Officer, Artificial insemination	Do.
District Veterinary Officer, Madras	Do.

3. *District Touring Maps.*

Director of Animal Husbandry	Each one set.
Deputy Director of Animal Husbandry (Veterinary)	Do
Deputy Director of Animal Husbandry (Livestock)	Do.
Deputy Director of Animal Husbandry (Key Village Schemes).	Do.
Sheep and Goat Development Officer	Do.
Veterinary Disease Investigation Officer (Sheep and Goat)	Do.

ANNEXURE II—cont.

3. *District Touring Maps*—cont.

Veterinary Disease Investigation Officer (Cattle)	Do.
Veterinary Disease Investigation Officer (Poultry) ..	Do.
Poultry Development Officer, Madras	Do.
Special Officer, Artificial Insemination, Madras	Do.
Veterinary Assistant Surgeon-in-charge of Sheep Demonstration Units, Madurai.	One copy in each of Madurai, District only.
Veterinary Assistant-Surgeon-in-charge of Sheep Demonstration Units, Coimbatore.	One copy in each of Coimbatore and Nilgiris Districts only.
Veterinary Assistant Surgeon-in-charge of Sheep Demonstration Units, Cuddalore (South Arcot).	One copy in each of Thanjavur, and South Arcot, Districts only.
Inspector of Key Villages, Palani	One copy of Madurai District.
District Veterinary Officer, Chengalpattu	One copy of Chengalpattu District.
District Veterinary Officer, Madras	One copy of Madras District.
District Veterinary Officer, Vellore	One copy of North Arcot District.
District Veterinary Officer, South Arcot	One copy of South Arcot District.
District Veterinary Officer, Salem	One copy of Salem District.
District Veterinary Officer, Coimbatore West	One copy of Coimbatore and Nilgiris Districts.
District Veterinary Officer, Coimbatore East	One copy of Coimbatore District.
District Veterinary Officer, Tiruchirappalli South ..	One copy of Tiruchirappalli District.
District Veterinary Officer, Thanjavur west	One copy of Thanjavur District.
District Veterinary Officer, Madurai North Dindigul	One copy of Madurai District.
District Veterinary Officer, Ramanathapuram at Madurai	One copy of Ramanathapuram District.
District Veterinary Officer, Tirunelveli	One copy of Tirunelveli District.
District Veterinary officer, South Madurai	One copy of Madurai District.
Superindendent, Livestock Research Station, Hosur Cattle Farm.	One copy of Salem District.
Superintendent, Kangayam Cattle Improvement Scheme, Palayamkottai.	One copy of Coimbatore District.
Superintendent District Livestock Farm, Pudukottai ..	One copy of Pudukkottai District.

ia

ANNEXURE II—cont.

District Touring Maps—cont.	
Superintendent, District Livestock Farm, Orathanad ..	One copy of Thanjavur District.
Inspector of Key Villages, Kangayam	One copy of Coimbatore District.
4. *Taluk Maps.*	
Director of Animal Husbandry	One set.
District Veterinary Officers	One copy of each taluk under jurisdiction—Vide particulars under heading District Touring Maps.
Superintendent, Kangayam Cattle Improvement Scheme, Palayamkottai.	One copy of Dharapuram, Palladam and Erode taluks.
Superintendent, Live Stock Research Station, Hosur ..	One copy of Hosur Taluk.
Superintendent, District Livestock Farm, Pudukottai ..	One copy of Pudukottai Taluk.
Superintendent, District Livestock Farm, Orathanad ..	One copy of Orathanad Taluk.
Inspector of Key Villages, Kangayam	One copy of Each Taluk in Coimbatore District

ANNEXURE III-A.

LABOUR DEPARTMENT.

Name of officer.	*Jurisdiction.*	*Name of maps.*
(1)	(2)	(3)
Commissioner of Labour..	Tamil Nadu ..	Tamil Nadu District Atlas .. 2 Tamil Nadu Road Maps. 2 District Touring maps 2 sets. Taluk maps 2 sets. City Map of Madras— 3·3"=1 mile—1. 5"=1 mile—1.
Labour Officer, Madras-1.	Part of Madras City (Corporation Divisions 1 to 28).	Madras City Map.

Name of Officer.	*Jurisdiction.*	*District touring maps.*	*Taluk maps.*
(1)	(2)	(3)	(4)
Labour Officer, Madras-2.	Madras City except Corporation Divisions 1 to 28 and Chengalpattu District.	Madras City map and Chengalpattu District.	All taluks of Chengalpattu District.
Labour Officer, Salem.	North Arcot and Salem Districts.	North Arcot and Salem Districts.	All taluks of North Arcot and Salem Districts.

ANNEXURE III-A—*cont.*

Name of officer.	*Jurisdiction.*	*District touring maps.*	*Taluk maps.*
(1)	(2)	(3)	(4)
	LABOUR DEPARTMENT—*cont.*		
Labour Officer, Coimbatore.	Coimbatore, Avanashi Gobichettipalayam, Palladam, Erode and Bhavani taluks of Coimbatore District.	Coimbatore District.	Coimbatore, Avanashi Gobichettipalayam, Palladam, Erode and Bhavani taluks of Coimbatore District.
Labour Officer, Pollachi.	Pollachi, Udumalpet, and Dharapuram taluks of Coimbatore District.	Do.	Pollachi, Udumalpet and Dharapuram taluks of Coimbatore District.
Labour Officer, Madurai	Madurai District and Ramanathapuram and Devakottai Revenue Divisions of Ramanathapuram District.	Madurai and Ramanathapuram Districts.	All taluks of Madurai district and Ramanathapuram. Paramakudi Mudukulathur, Sivaganga, Tirupathur, and Tiruvadanai taluks of Ramanathapuram District.
Labour Officer, Tiruchirappalli.	Tiruchirappalli, Thanjavur and South Arcot Districts.	Tiruchirappalli Thanjavur and South Arcot Districts.	All taluks of Tiruchirappalli, Thanjavur and South Arcot Districts.
Labour Officer, Tirunelveli.	Tirunelveli District and Sivakasi Revenue Division of Ramanathapuram District.	Tirunelveli and Ramanathapuram District.	All taluks of Tirunelveli District and Sattur, Srivilliputhur and Aruppukottai taluks of Ramanathapuram District.

ANNEXURE—III-A—*cont.*

Name of Officer.	*Jurisdiction.*	*District touring maps.*	*Taluk maps.*
(1)	(2)	(3)	(4)
Labour Department—cont.			
Labour Officer, Coonoor.	The Nilgiris District	The Nilgiris District.	All taluks of the Nilgiris District.
Labour Welfare Officer, Coonoor.	Do.	Do.	Do.
Labour Officer, Nagercoil.	Kanyakumari	Kanyakumari	All taluks of Kanyakumari District.

ANNEXURE III-B.

LABOUR DEPARTMENT—FACTORIES BRANCH

STATEMENT. I

Name of Officer.	*Jurisdiction.*	*District Touring Maps.*	*Taluk Maps.*
(1)	(2)	(3)	(4)
Chief Inspector of Factories.Madras.	Tamil Nadu	Two sets.	One set.
Regional Inspector of Factories, Madras.	Madras, Chengalpattu, South Arcot, and North Arcot Districts.	One copy under jurisdiction.	One copy under jurisdiction.
Regional Inspector of Factories, Tiruchirapalli.	Tiruchirappalli and Thanjavur Districts	Do.	Do.
Regional Inspector of Factories, Madurai.	Madurai, Ramanathapuram and Tirunelveli Districts.	Do.	Do.
Regional Inspector of Factories, Coimbatore.	Coimbatore, Salem, and the Nilgiris Districts.	Do.	Do.
Inspector of Factories, Vellore.	North Arcot and South Arcot Districts.	Do.	Do.
Inspector of Factories, Thanjavur.	Thanjavur District.	Do.	Do.
Inspector of Factories, Madurai.	Madurai and Ramanathapuram Districts.	Do.	Do.
Inspector of Factories, Tirunelveli.	Tirunelveli district	Do.	Do.
Inspector of Factories, Salem.	Salem district, Bhavani and Erode taluks of Coimbatore District.	Do.	Do.
Inspector of Factories, Tiruppur.	Palladam, Avanashi, Dharapuram, Pollachi and Udumalpet taluks of Coimbatore District.	Do.	Do.

ANNEXURE III-B—*cont*.

LABOUR DEPARTMENT FACTORIES BRANCH—*cont*.

STATEMENT I-*cont*.

Name of Officer. (1)	*Jurisdiction.* (2)	*District Touring Map* (3)	*Taluk Map.* (4)
Inspector of Factories, Madras XIII.	Part of Madras City.	Madras City Map.	
Inspector of Factories, Madras, XIV.	Part of Madras City and Chengalpattu district.	Madras City map and Chengalpattu district.	One set of taluk maps of Chengalpattu district.
Inspector of Factories, Coimbatore.	Coimbatore, Salem and North Arcot Districts.	One copy under jurisdiction.	One copy under jurisdiction

Name of Officer (1)	*Jurisdiction* (2)	*Taluk Maps* (3)	*Town Maps* (4)
Assistant Inspector of Labour, Tiruvottiyur.	Ponneri and Saidapet taluks.	One copy under jurisdiction.	..
Assistant Inspector of Labour, St. Thomas Mount.	Saidapet taluk.	Do.	..
Assistant Inspector of Labour, Chengalpattu	Chengalpattu and Maduranthakam and sub-taluk map of Uthiramerur of Kancheepuram taluk.	Do.	..
Assistant Inspector of Labour, Kancheepuram-I.	Kancheepuram Town.	..	One copy under jurisdiction.
Assistant Inspector of Labour, Kancheepuram II.	Kancheepuram taluk.	One copy under jurisdiction.	..
Assistant Inspector of Labour, Tiruvallur.	Tiruvallur and Sriperumbudur taluks.	Do.	..
Assistant Inspector of Labour Thirupathur North Arcot	Tirupathur taluk.	Do.	One copy under jurisdiction.
Assistant Inspector of Labour, Vaniyambadi, I.	Vaniyambadi town and Tirupathur taluk.	One copy under jurisdiction.	One copy under jurisdiction.
Assistant Inspector of Labour, Vaniyambadi II.	Vaniyambadi town and Gudiyatham taluk.	Do.	Do.
Assistant Inspector of Labour, Ambur.	Vellore taluk.	Do.	....

ANNEXURE III-B—*cont.*

LABOUR DEPARTMENT FACTORIES BRANCH—*cont.*

STATEMENT I—*cont.*

Name of Officer.	*Jurisdiction.*	*Taluk maps.*	*Town Maps.*
1	2	3	4
Assistant Inspector of Labour, Gudiyatham	Gudiyatham taluk.	Do.	....
Assistant Inspector of Labour, Vellore-I.	Vellore Town.	....	One copy under jurisdiction.
Assistant Inspector of Labour, Vellore-II.	Do.	....	Do.
Assistant Inspector of Labour, North Arcot.	Wallajah and Cheyyar taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Walajapet.	Walajapet and Arkonam taluks.	Do.	....
Assistant Inspector of Labour, Arni.	Arni, Wandiwash and Polur taluks.	Do.	....
Assistant Inspector of Labour, Tiruvannamalai.	Chengam, Polur and Tiruvannamalai taluks.	Do.	...
Assistant Inspector of Labour, Cuddalore-I.	Cuddalore and Chidambaram taluks.	Do.	....
Assistant Inspector of Labour, Cuddalore-II.	Cuddalore taluk.	Do.	....
Assistant Inspector of Labour, Villupuram-I.	Tindivanam, Gingee and Villupuram taluks.	Do.	...
Assistant Inspector of Labour, Villupuram-II.	Villupuram, Tirukoilur and Kallakurichi taluks.	Do.	....
Assistant Inspector of Labour, Chidambaram.	Chidambaram taluk	One copy under jurisdiction.	....
Assistant Inspector, of Labour, Viruddhachalam.	Viruddhachalam, Kallakurichi and Chidambaram taluks.	Do.	...
Assistant Inspector of Labour, Thanjavur-I.	Thanjavur town.	...	One copy under jurisdiction.
Assistant Inspector of Labour, Thanjavur II	Thanjavur town and Pattukkottai and Thanjavur taluks.	One copy under jurisdiction.	Do.

ANNEXURE III-B—*cont.*

LABOUR DEPARTMENT FACTORIES BRANCH—*cont.*

STATEMENT I—*cont.*

1	2	3	4
Assistant Inspector of Labour, Thanjavur-III.	Papanasam and Thanjavur taluks.	....	Do.
Assistant Inspector of Labour, Kumbakonam-I.	Kumbakonam town.	....	One copy under jurisdiction.
Assistant Inspector of Labour, Kumbakonam-II.	Kumbakonam and Mayuram taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Mayuram.	Sirkali and Mayuram taluks.	Do.	....
Assistant Inspector of Labour, Nagapattinam.	Nagapattinam town.	....	One copy under jurisdiction.
Assistant Inspector of Labour, Tiruvarur.	Nagapattinam and Nannilam taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Mannargudi.	Mannargudi taluk.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Tiruthuraipoondi.	Tiruthuraipoondi.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Pattukkottai.	Pattukkottai and Arantangi taluks	One copy under jurisdiction.	....
Assistant Inspector of Labour, Tiruchirappalli. I	Tiruchirappalli town.	....	One copy under jurisdiction.
Assistant Inspector of Labour' Tiruchirappalli II	Tiruchirappalli Town	....	One copy under jurisdiction.
Assistant Inspector of Labour Tiruchirappalli. III	Do.	....	Do.
Assistant Inspector of Labour, Tiruchirappalli. IV	Do.	....	Do
Assistant Inspector of Labour, Srirangam.	Tiruchirappalli Town	One copy under jurisdiction.	....
Assistant Inspector of Labour, Karur.	Karur town	....	One copy under jurisdiction.

ANNEXURE III-B—*cont.*

LABOUR DEPARTMENT FACTORIES BRANCH—*cont.*

STATEMENT I—*cont.*

1	2	3	4
Assistant Inspector of Labour, Kulittalai.	Karur and Kulittalai taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Pudukkottai-I	Pudukkottai town and Alangudi and Kolathur taluks.	One copy under jurisdiction.	One copy under jurisdiction.
Assistant Inspector of Pudukkottai II.	Pudukkottai town and Tirumayam Taluk.	One copy under jurisdiction.	One copy under jurisdiction.
Assistant Inspector of Labour, Lalgudi.	Thuraiyur and Musiri taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Ariyalur.	Udayarpalayam taluk.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Musiri.	Musiri taluk	One copy under jurisdiction.	....
Assistant Inspector of Labour, Madurai I.	Madurai town	....	One copy under jurisdiction.
Assistant Inspector of Labour, Madurai II.	Madurai town	....	One copy under jurisdiction.
Assistant Inspector of Labour, Madurai III.	Madurai town	....	One copy under jurisdiction.
Assistant Inspector of Labour, Madurai IV.	Madurai town	....	One copy under jurisdiction
Assistant Inspector of Labour, Madurai V.	Madurai town	....	One copy under jurisdiction.
Assistant Inspector of Labour, Madurai VI.	Madurai town	....	One copy under jurisdiction.
Assistant Inspector of Labour, Madurai VII.	Madurai and Melur taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Kodaikanal.	Kodaikanal, Nilakottai and Dindigul taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Dindigul.	Dindigul Town	....	One copy under jurisdiction
Assistant Inspector of Labour, Dindigul II.	Dindigul Taluk	One copy under jurisdiction.	....

ANNEXURE III-B—*cont.*

LABOUR DEPARTMENT FACTORIES BRANCH—*cont.*

STATEMENT I—*cont*

1	2	3	4
Assistant Inspector of Labour, Palani.	Palani taluk ..	One copy under Jurisdiction	....
Assistant Inspector of Labour, Usilampatti.	Thirumangalam and Periyakulam taluks.	Do.	....
Assistant Inspector of Labour, Periyakulam.	Periyakulam taluk ..	Do.	....
Assistant Inspector of Labour, Bodinaickanur.	Periyakulam taluk ..	Do.	....
Assistant Inspector of Labour, Cumbum.	Periyakulam taluk ..	Do.	....
Assistant Inspector of Labour, Virudhunagar.	Virudhunagar town ..	....	One copy under jurisdiction.
Assistant Inspector of Labour, Sivakasi.	Sattur taluk ..	One copy under jurisdiction.	....
Assistant Inspector of Labour, Srivilliputtur.	Srivilliputtur taluk ..	Do.	One copy under jurisdiction.
Assistant Inspector of Labour, Rajapalayam.	Srivilliputtur taluk and Rajapalayam town.	Do.	Do.
Assistant Inspector of Labour, Aruppukkottai.	Aruppukkottai taluk	Do.	....
Assistant Inspector of Labour, Karaikudi.	Karaikudi town ..	Do	....
Assistant Inspector of Labour, Tiruppathur. (Ramanathapuram)	Tiruppathur taluk ..	Do	....
Assistant Inspector of Labour, Devakottai.	Tiruvadanai and Sivaganga Taluks.	Do	....
Assistant Inspector of Labour, Manamadurai	Sivaganga, Mudukulathur and Paramakudi taluks.	Do	....
Assistant Inspector of Labour, Ramanathapuram.	Ramanathapuram and Paramakudi taluks.	Do.	....

ANNEXURE III-B—*cont.*

LABOUR DEPARTMENT FACTORIES BRANCH—*cont.*

STATEMENT I—*cont.*

Name of Officer.	*Jurisdiction.*	*Taluk maps.*	*Town maps.*
(1)	(2)	(3)	(4)
Assistant Inspector of Labour, Tirunelveli.	Tirunelveli town ..	....	One copy under jurisdiction.
Assistant Inspector of Labour, Palayamkottai.	Tirunelveli taluk and Palayamkottai town.	One copy under jurisdiction.	Do.
Assistant Inspector of Labour, Melapalayam.	Melapalayam town and Nanguneri taluk.	Do.	Do.
Assistant Inspector of Labour, Tuticorin-I.	Tuticorin town. ..	....	Do.
Assistant Inspector of Labour, Tuticorin-II.	Do.	....	Do
Assistant Inspector of Labour, Ambasamudram.	Ambasamudram taluk.	One copy under jurisdiction.	Do.
Assistant Inspector of Labour, Tenkasi.	Tenkasi and Sankarankoil taluks.	Do.	....
Assistant Inspector of Labour, Srivaikuntam.	Srivaikuntam and Tiruchendur taluks.	Do.	....
Assistant Inspector of Labour, Koilpatti.	Koilpatti taluk ..	Do.	....
Assistant Inspector of Labour, Salem-I.	Salem Town ..	....	One copy under jurisdiction
Assistant Inspector of Labour, Salem-II.	Salem Town.	....	One copy under jurisdiction.
Assistant Inspector of Labour, Salem-III.	Do.	....	Do.
Assistant Inspector of Labour, Salem-IV.	Salem and Omalur taluks.	One copy under jurisdiction	Do.
Assistant Inspector of Labour, Rasipuram.	Rasipuram and Attur taluks.	Do.	....
Assistant Inspector of Labour, Namakkal.	Namakkal taluk ..	Do.	....
Assistant Inspector of Labour, Tiruchengode.	Tiruchengode taluk,	Do.	....
Assistant Inspector of Labour, Dharmapuri.	Dharmapuri and Harur taluks.	One copy under jurisdiction.	....
Assistant Inspector of Labour, Krishnagiri.	Krishnagiri and Hosur taluks.	Do.	....

ANNEXURE III-B—*cont.*

LABOUR DEPARTMENT FACTORIES BRANCH—*cont.*

STATEMENT I—*cont.*

1	2	3	4
Assistant Inspector of Labour, Coimbatore I.	Coimbatore town ..	....	One copy under jurisdiction.
Assistant Inspector of Labour, Coimbatore-II.	Do.	....	Do.
Assistant Inspector of Labour, Coimbatore-III.	Do.	....	Do.
Assistant Inspector of Labour, Coimbatore-IV.	Coimbatore taluk ..	One copy under jurisdiction.	Do.
Assistant Inspector of Labour, Gobichetti-palayam.	Gobichettipalayam taluk.	Do.	....
Assistant Inspector of Labour, Erode-I.	Erode town ..	..	One copy under jurisdiction.
Assistant Inspector of Labour, Erode-II.	Erode town and Bhavani taluk.	One copy under jurisdiction.	Do
Assistant Inspector of Labour, Mettupa-layam.	Avanashi taluk ..	One copy under jurisdiction.	....
Assistant Inspector of Labour, Tiruppur.	Palladam taluk ..	Do.	....
Assistant Inspector of Labour, Dharapuram.	Dharapuram taluk ..	Do.	....
Assistant Inspector of Labour, Pollachi-I.	Pollachi taluk ..	Do	One copy under jurisdiction
Assistant Inspector of Labour, Pollachi-II.	Do.	Do.	Do.
Assistant Inspector of Labour, Udumalpet.	Udumalpet and Palladam taluks.	Do.	....
Assistant Inspector of Labour, Coonoor.	Coonoor taluk ..	One copy under jurisdiction.	One copy under jurisdiction.
Assistant Inspector of Labour, Ootacamund.	Ootacamund and Gudalur taluks.	Do.	Do.
Assistant Inspector of Labour, Madras (I to XXI).	Madras City ..	..	Four copies of the Madras City Map.
Chief Inspector of Factories.	Tamil Nadu	...	Tamil Nadu district Atlas-2.
Do.	...		Tamil Nadu Road Map-2

ANNEXURE III-C.

LABOUR DEPARTMENT EMPLOYMENT SERVICE.

Name of Officer:	Jurisdiction.	Name of maps.
1	2	3
Director of Employment	Tamilnadu —	Tamilnadu District Atlas 1 set. Tamilnadu Road map 1 set. District Touring map-1 set. City map of Madras 3·3" = 1 Mile - 1 set. 5" = 1 Mile - 1 set.
District Employment officer, Madras.	Madras City	City map of Madras 3·3" = 1 Mile - 3 sets.
Junior Employment Officer, Saidapet.	Chengalpattu District and Parts of Madras City.	-do- District Touring Maps.
District Employment Officer, Cuddalore.	South Arcot.	South Arcot.
District Employment Officer, Tiruchirappalli.	Tiruchirappaili	Tiruchirappalli.
District Employment Officer Thanjavur	Thanjavur	Thanjavur.
District Employment Officer, Madurai	Madurai	Madurai.
District Employment Officer, Ramanathapuram	Ramanathapuram	Ramanathapuram.
District Employment Officer, Tirunelveli	Tirunelveli	Tirunelveli.
District Employment Officer, Kanniyakumari	Kanniyakumari	Kanniyakumari,
District Employment Officer, Vellore	North Arcot	North Arcot.
District Employment Officer, Salem	Salem	Salem.
District Employment Officer, Coimbatore	Coimbatore	Coimbatore
Junior Employment Officer, Ootacamund.	Nilgiris	Nilgiris
Junior Employment Officer, Saidapet.	Chengalpattu	Chengalpattu

ANNEXURE IV.

AGRICULTURAL DEPARTMENT

Name of Officer.	*Tamil Nadu District Atlas.*	*Tamil Nadu Road Maps.*
(1)	(2)	(3)
Director of Agriculture, Madras	2	5*
State Marketing Officer, Madras	..	1
Deputy Director of Agriculture, Coimbatore	..	1
Deputy Director of Agriculture, Coimbatore	..	1
Assistant Marketing Officer, Madurai	..	1
Assistant Marketing Officer, Cuddalore	..	1
Deputy Director of Agriculture, Thanjavur	..	1
Deputy Director of Agriculture, Madurai	..	1
Deputy Director of Agriculture Madras	..	1
Principal, Agricultural College and Research Institute, Coimbatore.	2	2
Cotton Specialist, Coimbatore	..	1
Millet and Pulses Specialist, Coimbatore	..	1
Paddy Specialist, Coimbatore	..	1
Oilseeds Specialist, Coimbatore	..	1
Horticulturist and Professor of Horticulture	..	1

* One copy each to the three Head Quarters Deputy Directors of Agriculture, Madras.

Name of Officer.	*District Touring maps..*	*Taluk maps.*	*Other Maps.*
(1)	(2)	(3)	(4)
Director of Agriculture, Madras.	Two sets ..	One set ..	....
State Marketing Officer, Madras.	One set ..	Do.	....
Deputy Director of Agriculture, Coimbatore.	One copy in each of the Coimbatore and Nilgiris and Salem District.	....	....

ANNEXURE IV—*cont.*

AGRICULTURAL DEPARTMENT—*cont.*

Name of Officer	*District Touring Maps*	*Taluk Maps*	*Other Maps*
1	2	3	4
Deputy Director of Agriculture, Thanjavur.	One copy in each of the Thanjavur and Tiruchirapalli districts.	....	....
Deputy Director of Agriculture, Madurai.	One copy in each of the Madurai, Ramanathapuram, Tirunelveli and Kanyakumari Districts.	....	....
Deputy Director of Agriculture, Madras.	One copy in each of the North Arcot, Salem and Chengalpattu Districts	....	....
Curator, Government Botanical Gardens, Ootacamund.	One copy of the Nilgiris district.	....	....
District Agricultural Officer, Ootacamund.	Do.	One copy in each of the taluks in the Nilgiris.	....
District Agricultural Officer, Guindy.	One copy of Chengalpattu district.	One copy of in each of the taluks in the Chengalpattu District.	City Map of Madras-7 copies.
District Agricultural Officer, Vellore.	One copy of North Arcot District.	One copy in each of the taluks in the North Arcot District.	....
District Agricultural Officer, Cuddalore.	One copy of South Arcot District.	One copy in each of the taluks in the South Arcot District.	....
District Agricultural Officer, Salem.	One copy of Salem District.	One copy in each of the taluks in the Salem District.	....

ANNEXURE IV—*cont.*

AGRICULTURAL DEPARTMENT—*cont.*

Name of Officer.	*District Touring Maps.*	*Taluk Maps.*	*Other Maps.*
(1)	(2)	(3)	(4)
District Agricultural Officer, Tiruchirappalli.	One copy of Thiruchirappalli District.	One copy in each of the taluks in the Tiruchirappalli District.	....
District Agricultural Officer, Thanjavur.	One copy of Thanjavur District.	One copy in each of the taluks of Thanjavur, Papanasam, Kumbakonam, Mayavaram, Sirkali and Nannilam.	....
District Agricultural Officer, Pattukkottai.	Do.	One copy in each of the taluks of Arantangi, Mannargudi, Tiruthuraippoondi, Nagapattinam and Pattukkottai.	
District Agricultural Officer, Sattur.	One copy of Ramanathapuram, District.	One copy of each of the taluks of Ramanathapuram district.	....
District Agricultural Officer, Tirunelveli.	One copy of Tirunelveli district.	One copy of each of the taluks of Tirunelveli district.	....
District Agricultural Officer, Coimbatore.	One copy of Coimbatore District.	One copy of each of the taluks of Coimbatore District.	Town Map of Coimbatore- One copy.
District Agricultural Officer, Madurai.	One copy of Madurai District.	One copy of each of the taluks of Madurai District.	Town Map of Madurai- One copy.
Special District Agricultural Officer, (Crop Sampling, Madurai).	One copy of Madurai, Ramanathapuram and Tirunelveli districts.	One copy of each of the taluks in the Madurai, Ramanathapuram and Tirunelveli districts.	....
Assistant Marketing Officer, Madurai.	One copy of Coimbatore, the Nilgiris, Salem and North Arcot Districts.	....	....

ANNEXURE IV—*contd.*

Agricultural Department—*contd.*

Name of Officer.	*District Touring Maps.*	*Taluk Maps.*	*Other Maps.*
(1)	(2)	(3)	(4)
Crop and Plant Protection Officer (Mycology) Coimbatore.	One of all the Taluks in the district in the State.	One set of all Taluks in the the districts in the State.	....
Cotton Extension Officer, Coimbatore.	Do.	Do.	....
Banana Research Officer, Aduthurai.	One copy of Thanjavur district.	One copy each of the taluks of Thanjavur district.	....
Assistant Horticulturist, Coonoor.	One copy of the Nilgiris district.	One copy each of the taluks of Nilgiris district.	....
Assistant Cotton Specialist, Karunganni Scheme, Koilpatti.	One copy of Tirunelveli district.	One copy each of the taluks of Tirunelveli district.	....
Agronomist, Agricultural Research Station, Sathyamangalam.	One copy of the Coimbatore district.	One copy each of the taluks of Coimbatore district.	....
Assistant Agricultural Engineer (Inspection), Madurai.	One copy each of Madurai, Ramanathapuram, Tirunelveli and Kanyakumari. districts.	One copy each of the taluks of Madurai, Ramanathapuram Tirunelveli and Kanyakumari districts.	....
Assistant Agricultural Engineer (Inspection), Coimbatore.	One copy of Coimbatore district.	One copy each of the taluks of Coimbatore district.	....
Assistant Agricultural Engineer (Inspection), Tiruchirappalli.	One copy of Tiruchirapalli, Thanjavur, South Arcot and Salem districts.	One copy each of the taluks of Tiruchirappalli, Thanjavur South Arcot and Salem districts.	....

ANNEXURE IV—*cont*.

AGRICULTURAL DEPARTMENT—*cont*

1	2	3	4
Assistant Agricultural Engineer (C.A.E.S.), Madras.	One copy each of Chengalpattu and North Arcot districts.	One copy each of the taluks of Chengalpattu and North Arcot districts.	City map Madras copy.
Assistant Agricultural Engineer (Soil Conservation), Ootacamund.	One copy of the Nilgiris district.	One copy each of the taluks of the Nilgiris district.	....
Assistant Agricultural Engineer (Soil Conservation), Coimbatore.	One copy of the Coimbatore district.	One copy each of the taluks of Coimbatore district.	....

ANNEXURE
DELETED

ANNEXURE—VI.

INDUSTRIES, COMMERCE AND FISHERIES DEPARTMENT.

Statement I.

Name of Officer.	*Jurisdiction.*	*Tamil Nadu State districts Atlas.*	*Tamil Nadu State road map.*	*City Map of Madras.*
(1)	(2)	(3)	(4)	(5)
Director of Industries and Commerce, Madras.	Tamil Nadu.	2	6	10"—1 Mile—6 5"—1 Mile—2 3·3"—1 Mile—2
	*Industrial Engineer, Madras	1		
	Assistant Director of Fisheries (Craft and Tackle, Madras.)	1		
	Assistant Director of Industries and Commerce, Madras.	1		
	Director of Industries and Commerce.	2		

Statement II.

Name of Officer.	*Jurisdiction.*	*District Touring Maps.*	*Taluk Maps.*
(1)	(2)	(3)	(4)
Director of Industries and Commerce, Madras.	Tamil Nadu.	Seven sets.	One set.
Assistant Director of Industries and Commerce, Madras.	Madras district Madras (City Map).*	..	*(*vide* statement above).
Assistant Director of Industries and Commerce, Chengalpattu.	Chengalpattu district.	One copy under jurisdiction.	One copy under jurisdiction
Assistant Director of Industries and Commerce, South Arcot, Cuddalore.	South Arcot district.	Do.	Do.
Assistant Director of Industries and Commerce, Thanjavur.	Thanjavur district.	Do.	Do.
Assistant Director of Industries and Commerce, Tiruchirappalli	Tiruchirapalli district.	Do.	Do.

ANNEXURE VI—*cont.*

INDUSTRIES, COMMERCE AND FISHERIES DEPARTMENT—*cont.*

STATEMENT II—*cont.*

1	2	3	4
Assistant Director of Industries and Commerce, Madurai.	Madurai district.	One copy under jurisdiction.	One copy under jurisdiction
Assistant Director of Indiustries and Commerce, Ramanathapuram, Madurai.	Ramanathapuram district.	Do.	Do.
Assistant Director of Industries and Commerce, Tirunelveli district.	Tirunelveli district.	Do.	Do.
Assistant Director of Industries and Commerce, North Arcot, Vellore.	North Arcot district.	Do.	Do.
Assistant Director of Industries and Commerce, Salem.	Salem district.	Do.	Do.
Assistant Director of Industries and Commerce, (Industries) Coimbatore	Coimbatore district.	Do.	Do.
Assistant Director of Industries and Commerce (Boring), Coimbatore.	Coimbatore and Nilgiris districts.	Do.	Do.
	FISHERIES.		
Assistant Director of Fisheries, Madurai.	Madurai and Ramanathapuram districts.	One copy under jurisdiction.	One copy under jurisdiction.
Assistant Director of Fisheries, Thanjavur.	Thanjavur and Tirunelveli districts.	Do.	Do.
Assistant Director of Fisheries, Vellore.	Madras, Chengalpattu North Arcot and South Arcot districts.	Madras, (City Map)* and one copy in each of Chengalpattu, North Arcot and South Arcot districts.	*(*Vide* Statement I. One copy under jurisdiction.

ANNEXURE VI—*cont.*

INDUSTRIES COMMERCE AND FISHERIES DEPARTMENT—*cont.*

STATEMENT II—*cont.*

FISHERIES—*cont.*

1	2	3	4
Assistant Director of Fisheries (Fresh Water Biology), Bhavanisagar.	Coimbatore and Nilgiris districts.	One copy under jurisdiction.	One copy under jurisdiction.
Assistant Director of Fisheries, Salem, Mettur Dam.	Salem district.	Do.	Do.
Assistant Director of Fisheries, Tirunelveli, Tuticorin.	Tirunelveli district.	Do.	Do.

ANNEXURE VII.

EDUCATION DEPARTMENT.

Name of Officer.	*Jurisdiction.*	*District Touring maps.*	*Taluk maps.*
(1)	(2)	(3)	(4)
Divisional Inspector of Schools, Madurai.	Madras, Chengalpattu, South Arcot, Thanjavur, Madurai, Ramanathapuram, Tirunelveli district.	One copy under jurisdiction.	One copy under jurisdiction.
Divisional Inspector of Schools, Coimbatore.	North Arcot, Salem, Coimbatore, Nilgiris and Tiruchirappalli districts.	Do.	Do.
Basic Educational Officer, Coimbatore.	Do.	Do.	Do.
Basic Educational Officer, Madurai.	Madras, Chengalpattu, South Arcot, Thanjavur, Madurai, Ramanathapuram, and Tirunelveli districts.	Do.	Do.
Inspector of Girls Schools, Madras.	Madras district.	Madras (City map).	....
Inspector of Girls' Schools, Salem.	Coimbatore, Nilgiris Salem and South Arcot districts.	One copy under jurisdiction.	One copy under jurisdiction.
Inspector of Girls Schools, Madurai.	Madurai, Ramanathapuram and Tirunelveli districts.	Do.	Do.
Divisional Inspector of Schools, Coimbatore.	North Arcot, Salem, Coimbatore, Nilgiris and Tiruchirappalli districts.	Do.	Do.
Basic Educational Officer, Coimbatore.	Do.	Do	Do.
Basic Educational Officer, Madurai.	Madras, Chengalpattu, South Arcot, Thanjavur, Madurai, Ramanathapuram and Tirunelveli, districts.	Do.	Do.
Inspector of Girls Schools, Madras.	Madras district.	Madras (City map).	.. ..

ANNEXURE VII—*cont.*

EDUCATION DEPARTMENT—*cont.*

(1)	(2)	(3)	(4)
Inspectress of Girls' Schools, Salem.	Coimbatore, Nilgiris, Salem and South Arcot districts.	One copy under jurisdiction.	One copy under jurisdiction.
Inspectress of Girls' Schools, Madurai.	Madurai, Ramanathapuram and Tirunelveli districts.	Do.	Do.
Inspectress of Girls' Schools, Thanjavur.	Chengalpattu, South Arcot, Tiruchirappalli and Thanjavur districts.	Do.	Do.
District Educational Officer, Madras.	Madras district.	Madras (City map 7 in each scale).	....
District Educational Officer, Saidapet.	Chengalpattu district.	6 to 8 copies under jurisdiction.	One copy under jurisdiction.
District Educational Officer, Cuddalore, N.T.	South Arcot district.	One copy under jurisdiction.	Do.
District Educational Officer, Nagapattinam Thanjavur East.	Thanjavur district.	Do.	Do.
District Educational Officer Thanjavur West Thanjavur.	Do.	Do.	Do.
District Educational Officer, Madurai.	Madurai district.	Do.	Do.
District Educational Officer, Ramanathapuram at Madurai.	Ramanathapuram district	Do.	Do.
District Educational Officer, Tirunelveli. East Tirunelveli.	Tirunelveli district.	Do.	Do
District Educational Officer, Tirunelveli West Palayamkottai.	Do.	Do.	Do.

ANNEXURE VII—*cont*

EDUCATION DEPARTMENT—*cont*.

1	2	3	4
District Educational Officer, Vellore, North Arcot.	North Arcot district	One copy under jurisdiction.	One copy under jurisdiction.
District Educational Officer, Salem.	Salem district.	Do.	Do.
District Educational Officer, Tiruchirappalli.	Tiruchirappalli district	Do.	Do.
District Educational Officer, Coimbatore.	Coimbatore district.	Do.	Do.
District Educational Officer, Coonoor. Nilgiris.	Nilgiris district.	Do.	Do.
Inspector of Anglo-Indian Schools, Madras.	Tamil Nadu	One set.	....
Inspector of Anglo-Indian Schools, Madras.	Do.	Do.	....
Chief Inspector of Physical Education, Madras.	Do.	One set and one copy of City map of Madras 10"=1 mile.	....
Women (Specialist in Physical) Education, Madras.	Do.	Do.	....
Director of Public Instruction, Madras.	Do.	4 to 8 setsDistrict. Tamil Nadu Atlas—2. Tamil Nadu Road Map—2.	4 to 8 Ses.b

ANNEXURE VIII.

POLICE DEPARTMENT (FIRE SERVICES BRANCH).

Statement I.

Name of Officer.	*Nature of map*		*Number of copies.*
(1)	(2)		(3)
Inspector-General of Police Fire Services Branch, Madras.	Tamil Nadu district Atlas.		1
	Tamil Nadu Road Map.		1
	Town Maps.		
Sub-Officer, Chengalpattu and Station Officer, Chingleput.	Chengalpattu.	..	2
Sub-Officer, Kancheepuram and Station Officer, Chingleput.	Kancheepuram.	..	2
Sub-Officer, Arkonam and District Fire Officer, Vellore.	Arkonam	..	2
Sub-Officer, Gudiyatham and District Fire Officer, Vellore.	Gudiyatham	..	2
Sub-Officer, Ranipet and District Fire Officer, Vellore.	Ranipet	..	2
Sub-Officer, Tiruppathur and District Fire Officer, Vellore.	Tirupathur	..	2
Sub-Officer, Tiruvannamalai and District Fire Officer, Vellore.	Tiruvannamalai	..	2
Sub-Officer Vellore and DistrictFireOfficer, Vellore	Vellore	..	2
Sub-OfficerBodinayakanur andDistrictFireOfficer, Madurai North at Madurai.	Bodinayakanur	..	2
Sub-Officer, Dindigul and District Fire Officer, Madurai North at Madurai.	Dindigul	..	2
Sub-Officer, Palani and District Fire Officer,	MaduraiPalani	..	2
Sub-Officer, Periyakulam and District Fire Officer' Madurai.	Periyakulam	..	2
ub-Officer, Madurai and Station Officer, Madurai, Urban at Madurai.	Madurai	..	2
Sub-Officer, Karaikudi and StationOfficer, Ramanathapuram at Karaikudi.	Karaikudi	..	2

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT. (FIRE SERVICES BRANCH)—*cont.*

STATEMENT I—*cont.*

TOWN MAPS—*cont.*

(1)	(2)	
Sub-Officer, Chidambaram and District fire Officer, South Arcot, Cuddalore.	Chidambaram ..	2
Sub-Officer, Villupuram and District Fire Officer, South Arcot, Cuddalore.	Villupuram ..	2
Sub-Officer, Cuddalore and District Fire Officer, South Arcot, Cuddalore.	Cuddalore ..	2
Sub-Officer, Kumbakonam and District Fire Officer, Thanjavur.	Kumbakonam ..	2
Sub-Officer, Mannargudi and District Fire Officer, Thanjavur.	Mannargudi ..	2
Sub-Officer, Mayuram and District Fire Officer, Thanjavur.	Mayuram ..	2
Sub-Officer, Nagapattinam and District Fire Officer, Thanjavur.	Nagapattinam ..	2
Sub-Officer, Thanjavur and District Fire Officer, Thanjavur.	Thanjavur ..	2
Sub-Officer, Tiruvarur and District Fire Officer, Thanjavur.	Tiruvarur ..	2
Sub-Officer, Tuticorin and Station Officer, Tuticorin.	Tuticorin	2
Sub-Officer, Coimbatore and District Fire Officer, Coimbatore.	Coimbatore ..	2
Sub-Officer, Dharapuram and District Fire Officer, Coimbatore.	Dharapuram ..	2
Sub-Officer, Erode and District Fire Officer, Coimbatore.	Erode	2
Sub-Officer, Pollachi and District Fire Officer, Coimbatore.	Pollachi	
Sub-Officer, Tiruppur and District Fire Officer, Coimbatore.	Tiruppur	2
Sub-Officer, Udumalpet and District Fire Officer, Coimbatore.	Udumalpet ..	2
Sub-Officer, Salem and Station Officer, Salem	Salem	2
Sub-Officer, Coonoor and Station Officer, The Nilgiris, Ootacamund.	Coonoor ..	

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT [FIRE SERVICES BRANCH]—*cont*

STATEMENT I—*cont.*

TOWN MAPS—*cont.*

(1)	(2)	(3)
Sub-Officer, Ootacamund and Station Officer, Nilgiris. Ootacamund,	The Ootacamund	2
Sub-Officer, Karur, and District Fire Officer, Tiruchirappalli.	Karur	2
Sub-Officer, Tiruchirappalli, and District Fire Officer, Tiruchirappalli.	Tiruchirappalli ..	2

DISTRICT TOURING MAP.

(1)	(2)	(3)
Sub-Officers, Chingleput and Kancheepuram (one for each and) one for Station Officer, Chengalpattu.	Chingleput District .	3
Sub-Officers, Arkonam Gudiyatham, Ranipet, Tirupathur, Tiruvannamalai, and Vellore (one for each) and one for District Fire Officer, North Arcot, Vellore.	North Arcot District	7
Sub-Officers, Bodinayakanur, Dindigul, Palani and Periyakulam, (one for each) and one for District Fire Officer, Madurai North, Madurai.	Madurai District ..	5
Sub-Officers, Madurai and one for Station Officer, Madurai Urban, Madurai.	Madurai District ..	2
Sub-Officers, Karaikudi and one for Station Officer, Ramanathapuram at Karaikudi.	Ramanathapuram ..	2
Sub-Officers, Chidambaram, Cuddalore and Villuppuram (one for each) and one for District Fire Officer, South Arcot, Cuddalore.	South Arcot	4
Sub-Officers, Kumbakonam, Mannargudi, Mayuram, Nagapattinam, Tanjavur and Tiruvarur (one for each) and one for District Fire Officer, Thanjavur.	Thanjavur	7
Sub-Officers, Tuticorin and one for Station Officer, Tirunelveli at Tuticorin.	Tirunelveli	2
Sub-Officers, Coimbatore, Dharapuram, Erode, Pollachi, Tiruppur and Udumalpet (one for each) and one for District Fire Officer, Coimbatore.	Coimbatore	7
Sub-Officer, Salem and one for Station Officer,	Salem	2
Sub-Officers, Ootacamund, Coonoor and Station Officer, Nilgiris (one for each).	The Nilgiris	3

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT (FIRE SERVICES BRANCH)—*cont.*

STATEMENT I—*cont.*

TOWN MAPS—*cont.*

(1)	(2)	(3)
Sub-Officer, Karur and Tiruchirappalli (one for each) and one for District Fire Officer, Tiruchirappalli.	Tiruchirappalli ..	3
	City Map of Madras.	
Inspector-General of Police, Fire Service Branch, Madras-4.	3·3 inches=1 mile	1
Sub-Officers, Egmore, Guindy, High Court, Kilpauk, Triplicane, Teynampet, Vepery and Washermanpet (one for each).	Do.	8
Fire Control	Do.	1
Madras Fire Service State Training School, Madras	Do.	1
District Fire Officer, City (Egmore)	Do.	1
	Division Map of Madras City.	
Inspector-General of Police, Fire Service Branch, Madras.	3.3 inches=1 mile ..	1
District Fire Officer, Egmore	Do.	1

STATEMENT—II

	District Touring Maps.	
District Superintendent of Police, Chengalpattu ..	Chengalpattu ..	1
Sub-divisional Officer, St. Thomas Mount,	Do.	1
Sub-divisional Officer, Chengalpattu	Do.	1
Inspector-General of Police	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Do.	1
District Superintendent's Office, St. Thomas Mount	Do.	1
District Superintendent of Police, North Arcot ..	Do.	1
District Superintendent of Police, South Arcot ..	Do.	1
Commandant, Special Armed Police, Avadi ..	Do.	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT II—*cont.*

DISTRICT TOURING MAPS—*cont.*

(1)	(2)	(3)
Commissioner of Police, Madras	Chengalpattu	1
District Superintendent of Police, North Arcot.	North Arcot	1
District Superintendent's Office, North Arcot	North Arcot	1
Sub-divisional Officer, Vellore	North Arcot	1
Sub-divisional Officer Ambur, ...	Do.	1
Sub-divisional Officer, Ranipet	Do.	1
Sub-divisional Officer, Tiruvannammalai	Do.	1
District Superintendent of Police, South Arcot ..	Do.	1
District Superintendent of Police, Chengalpattu ..	Do.	1
District Superintendent of Police, Salem	Do.	1
Deputy Inspector-General of Police Railways and Criminal Investigation Department.	Do.	1
Inspector-General of Police, Madras	Do.	1
District Superintendent of Police, South Arcot ..	South Arcot	1
Sub-divisional Officer, Tirukkoyilur	Do.	1
Sub-divisional Officer, Cuddalore	Do.	1
Sub-divisional Officer, Tindivanam	Do.	1
Sub-divisional Officer, Chidambaram	Do.	1
District Superintendent's Office, South Arcot ..	Do.	1
Deputy Inspector-General of Police Southern Range	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Do.	1
Inspector-General of Police, Madras	Do.	1
District Superintendent of Police, North Arcot ..	Do.	1
District Superintendent of Police, Chengalpattu ..	Do.	1
District Superintendent of Police, Thanjavur ..	Do.	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT II—*cont.*

DISTRICT TOURING MAPS—*cont.*

(1)	(2)	(3)
District Superintendent of Police, Tiruchirappalli ..	South Arcot	1
District Superintendent of Police, Salem	Do.	1
District Superintendent of Police, Thanjavur ..	Thanjavur	1
Personal Assistant to District Superintendent of Police, Thanjavur.	Thanjavur	1
District Superintendent's Office, Thanjavur ..	Do.	1
Sub-divisional Officer, Thanjavur	Do.	1
Sub-divisional Officer, Pattukkottai	Do.	1
Sub-divisional Officer, Nagapattinam	Do.	1
Sub-divisional Officer, Kumbakonam	Do.	1
Sub-divisional Officer, Mannargudi	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department..	Do.	1
Deputy Inspector-General of Police, Southern Range	Do.	1
Inspector-General of Police, Madras	Do.	1
District Intelligence Bureau, Thanjavur	Do.	1
District Superintendent of Police, Ramanathapuram	Do.	1
District Superintendent of Police, Tiruchirappalli ..	Do.	1
District Superintendent of Police, South Arcot ..	Do.	1
District Superintendent of Police, Madurai North	Madurai	1
District Superintendent of Police, Madurai Urban	Do.	1
District Superintendent of Police, Coimbatore ..	Do.	1
District Superintendent of Police, Ramanathapuram	Do.	1
District Superintendent of Police, Tiruchirappalli ..	Do.	1
Inspector-General of Police, Madras	Do.	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT II—*cont.*

District Touring Maps—*cont.*

(1)	(2)	(3)
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Madurai	1
Deputy Inspector-General of Police, Southern Range	Do.	1
Sub-divisional Officer, Madurai	Do.	1
Sub-divisional Officer, Dindigul	Do.	1
Sub-divisional Officer, Kolar Reclamation	Do.	1
Sub-divisional Officer, Usilampatti	Do.	1
Deputy Superintendent of Police, Crime Branch Madurai	Do.	1
Personal Assistant to District Superintendent of Police, Madurai Urban.	Do.	1
Sub-divisional Officer, Palani	Do.	1
District Superintendent of Police, Ramanathapuram	Ramanathapuram	1
District Superintendent's Office, Ramanathapuram	Do.	1
Sub-divisional Officer, Sivakasi	Do.	1
Sub-divisional Officer, Sivaganga	Do.	1
Sub-divisional Officer, Ramanathapuram	Do.	1
Inspector-General of Police, Madras	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Do.	1
Deputy Inspector General of Police, Southern Range	Do.	1
District Superintendent of Police, Madurai North	Do.	1
District Superintendent of Police, Madurai Urban	Do.	1
District Superintendent of Police, Tirunelveli ..	Do.	1
District Superintendent of Police, Thanjavur ..	Do.	1
District Superintendent of Police, Tiruchirappalli ..	Do.	1
District Superintendent of Police, Tirunelveli ..	Tirunelveli	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT II—*cont.*

District Touring Maps—*cont.*

(1)	(2)	(3)
District Superintendent's Office, Tirunelveli ..	Tirunelveli	1
Sub-divisional Officer, Tirunelveli	Do.	1
Sub-divisional Officer, Tuticorin	Do.	1
Sub-divisional Officer, Sankaranayinarkoil	Do.	1
Sub-divisional Officer, Shermadevi	Do.	1
Deputy Inspector-General of Police, Southern Range	Do.	1
Deputy Inspector General of Police-Railways Criminal and Investigation Department.	Do.	1
Inspector-General of Police, Madras	Do.	1
District Superintendent of Police, Ramanathapuram	Do.	1
District Superintendent of Police, Tiruchirappalli ..	Tiruchirappalli ..	1
District Superintendent's Office, Tiruchirappalli ..	Do.	1
Sub-divisional Officer, Tiruchirappalli	Do.	1
Sub-divisional Officer, Karur	Do.	1
Sub-divisional Officer, Musiri	Do.	1
Sub-divisional Officer, Pudukkottai	Do.	1
Deputy Inspector-General of Police, Western Range	Do.	1
Deputy Inspector-General of Police, Southern Range	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Do.	1
Inspector-General of Police, Madras	Do.	1
District Superintendent of Police, Madurai North	Do.	1
District Superintendent of Police, Madurai Urban	Do.	1
District Superintendent of Police, Ramanathapuram	Do.	1
District Superintendent of Police, Thanjavur ..	Do.	1
District Superintendent of Police, Coimbatore ..	Do.	1
District Superintendent of Police, Salem	Do.	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT II—*cont.*

District Touring Maps—*cont.*

(1)	(2)	(3)
District Superintendent of Police, South Arcot	Tiruchirappalli	1
District Superintendent of Police, Salem	Salem	1
Sub-divisional Officer, Salem	Do.	1
Sub-divisional Officer, Namakkal	Do.	1
Sub-divisional Officer, Hosur	Do.	1
Sub-divisional Officer, Mettur	Do.	1
Inspector-General of Police, Madras	Do.	1
Deputy Inspector-General of Police, Western Range	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Do.	1
District Superintendent of Police, South Arcot ..	Do.	1
District Superintendent of Police, Coimbatore ..	Do.	1
District Superintendent of Police, North Aroct ..	Do.	1
District Superintendent of Police, Tiruchirappalli ..	Do.	1
District Superintendent's Office, Salem	Do.	1
District Superintendent of Police, Coimbatore ..	Coimbatore	1
District Superintendent's Office, Coimbatore ..	Do.	1
Sub-divisional Officer, Coimbatore Town	Do.	1
Sub-divisional Officer, Coimbatore Rural	Do.	1
Sub-divisional Officer, Erode	Do.	1
Sub-divisional Officer, Dharapuram	Do.	1
Deputy Inspector-General of Police, Western Range	Do.	1
Deputy Inspector-General of Police, Railways and Criminial Investigation Department.	Do.	1
Inspector-General of Police, Madras	Do.	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT II—*cont.*

District Touring Maps—*cont.*

(1)	(2)	(3)
District Superintendent of Police, Madurai North	Coimbatore	1
District Superintendent of Police, Madurai Urban	Do.	1
District Superintendent of Police, The Nilgiris ..	Do.	1
District Superintendent of Police, Tiruchirappalli ..	Do.	1
District Superintendent of Police, Salem	Do.	1
District, Superintendent of Police, The Nilgiris ..	The Nilgiris	1
District Superintendent's Office, The Nilgiris ..	Do.	1
Inspector-General of Police, Madras	Do.	1
Deputy Inspector-General of Police, Western Range	Do.	1
Deputy Inspector-General of Police, Railways and Criminal Investigation Department.	Do.	1
District Superintendent of Police, Coimbatore ..	Do.	1

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT III.

STATEMENT SHOWING THE NUMBER OF COPIES TO BE SUPPLIED TO THE INSPECTOR-GENERAL OF POLICE FOR USE AND FOR DISTRIBUTION TO HIS SUBORDINATES.

Name of the taluks. (1)	*Number to be supplied.* (2)	*Name of the taluks.* (1)	*Number to be supplied.* (2)
Chengalpattu district.—		*South Arcot district.—*	
Saidapet	5	Cuddalore	4
Ponneri	5	Villupuram	4
Tiruvallur	4	Chidambaram	4
Kancheepuram	4	Tindivanam	4
Chengalpattu	3	Vridhachalam	4
Maduranthakam	3	Gingee	4
Sriperumbudur	6	Tirukoyilur	4
		Kallakurichi	4
Madurai district.—		*Thanjavur district.—*	
Madurai	10	Thanjavur	5
Melur	4	Papanasam	5
Tirumangalam	8	Kumbakonam	5
Kodaikanal	5	Mayuram	5
Nilakottai	8	Sirkali	4
Dindigul	8	Mannargudi	8
Palani	6	Nannilam	6
Periyakulam	6	Thiruthuraipundi	5
		Nagapattinam	9
		Pattukkottai	8
		Aranthangi	4

ANNEXURE VIII—*cont.*

POLICE DEPARTMENT—*cont.*

STATEMENT III—*cont.*

(1)	(2)
Tirunelveli district.—	
Srivaikuntam	5
Tiruchendur	5
Sankarankoil	5
Koilpatti	7
Tirunelveli	4
Ambasamudram	6
Tenkasi	3
Nanguneri	4
North Arcot district.—	
Vellore	6
Walaja	4
Arkonam	4
Gudiyatham	5
Polur	4
Wandiwash	5
Tiruvannamalai	4
Tiruppattur	4
Arani division	4
Cheyyar	4
Ramanathapuram district.—	
Ramanathapuram	6
Paramakudi	5
Sivaganga	5
Tiruppattur	6
Aruppukkottai	5
Mudukulathur	4
Tiruvadanai	4
Sattur	5
Srivilliputhur	4
Nilgiris district.—	
Ootacamund	4
Coonoor	4
Gudalur	4

(1)	(2)
Salem district.—	
Salem	9
Rasipuram	3
Omalur	6
Attur	3
Tiruchengode	7
Dharmapuri	3
Namakkal	6
Krishnagiri	4
Hosur	3
Harur	3
Tiruchirappalli district.—	
Tiruchirappalli	7
Lalgudi	7
Udayarpalayam	4
Perambalur	4
Musiri	4
Kulitalai	5
Karur	4
Coimbatore district.—	
Coimbatore	5
Pollachi	5
Udumalpet	4
Dharapuram	4
Palladam	4
Erode	4
Gobichettipalayam	5
Kollegal	4
Bhavani	4
Avanasi	4

ANNEXURE VIII—*cont.*

STATEMENT VI.

DISTRICT INTELLIGENCE BUREAU-SUPPLY OF TALUK MAPS OF ADJOINING DISTRICTS.

District. (1)	*Name of taluk maps of adjoining districts.* (2)
Chengalpattu	Arkonam, Walajah and Wandiwash of North-Arcot district and Tindivanam of South Arcot district.
North Arcot	Gingee, Kallakurichi, Tindivanam and Tirukoyilur of South Arcot district, Hosur, Krishnagiri and Uthangarai of Salam district, Kancheepuram, Maduranthakam and Tiruvallur of Chengalpattu district.
South Arcot	Sirkali and Mayuram of Thanjavur district, Udayar palayam and Perambalur of Tiruchirappalli district, Harur and Attur of Salem district, Polur Tiruvannamalai and Wandiwash of North Arcot district, Madurantakam of Chengalpattu district.
Thanjavur	UdayarPalayam, Lalgudi and Tiruchirappalli of Tiruchirappalli district, Chidambaram of South Arcot district, Tiruppattur and Tiruvadanai of Ramanathapuram district.
Madurai North	Periyakulam and Tirumangalam of Madurai Urban district, Sivaganga and Tiruppattur of Ramanathapuram district, Manapparai and Karur of Tiruchirappalli district, Dharapuram and Udumalpet of Coimbatore district.
Madurai Urban	Aruppukkottai, Sattur and Srivilliputtur of Ramanathapuram district.
Ramanathapuram	Arantangi of Thanjavur district, Kulithalai of Tiruchirappalli district, Melur, Madurai, Tirumangalam and Periakulam of Madurai district, Koilpatti and Sankarankoil of Tirunelveli, district.
Tirunelveli	Mudukulathur, Sattur, Aruppukkottai and Srivilliputhur of Ramanathapuram district.
Tiruchirappalli	Thanjavur, Papanasam and Kumbakonam of Thanjavur district, Chidambaram, Virudhachalam and Kalakurichi of South Arcot district, Attur, Salem and Namakkal of Salem district Erode, Dharapuram of Coimbatore district, Palani, Madurai and Dindigul of Madurai district, Tiruppathur of Ramanathapuram district.
Salem	Erode, and Bhavani of Coimbatore district, Karur, Musiri, Perambalur of Tiruchirappalli district, Tiruvannamalai and Tiruppathur of North Arcot district, Kallakurichi and Vridhachalam of South Arcot district.
Coimbatore	Tiruchengode, Omalur, Dharmapuri and Namakkal of Salem district, Coonoor and Gudalur of the Nilgiris district, Karur of Tiruchirappalli district, Palani and Dindigul of Madurai district.
The Nilgiris	......

ANNEXURE X.

FOREST DEPARTMENT.

Statement showing the scale of free distribution of maps published by the Central Survey Office to Officers of the Forest Department in Tamil Nadu.

Officers to whom Maps to be supplied	Kind and number of copies of maps to be supplied: Tamil Nadu wall map.	Tamil Nadu district Atlas.	Tamil Nadu Road map.	District Touring map.	Taluk map.	village map.	City map of Madras,
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Chief Conservator of Forest	3	2	1	2*	..	..	2
State Silviculturist	..	1	1	2*	..	..	..
Conservator of Forests (Each)	1	2	1	2†	..	..	..
District Forest Officers (Each)	..	..	..	2†	2‡	2$	
Range Officers (each)	..	..	..	..	..	..	..
Forest Utilization Officer	..	..	..	1	..	.	..

* 2 Sets of all districts in the State.

† 2 Copies of each district in their jurisdiction.

‡ 2 Copies of each taluk in their jurisdiction.

$ 2 Sets of Village maps that border on Reserved Forest under the jurisdiction of each District Forest Officer.

ANNEXURE XI.

PUBLIC WORKS DEPARTMENT (HIGHWAYS)

Statement I.

Name of Officer.	*Nature of Map.*	*Number to be supplied*
(1)	(2)	(3)
Superintending Engineer, Madras Circle.	Tamil Nadu Wall Map	1
Superintending Engineer, Tiruchirappalli Circle.	Do.	1
Cheif Engineer, Madras	Do.	2
Superintending Engineer (Highways). Coimbatore Circle.	Do.	1
Superintending Engineer, Madras Circle.	Tamil Nadu District Atlas	1
Superintending Engineer (Highways). Coimbatore Circle.	Do.	1
Chief Engineer Madras	Do.	2
Superintending Engineer (Highways). Coimbatore Circle.	Do.	1
Superintending Engineer. Madras Circle.	Tamil Nadu Road Map	1
Superintending Engineer, Tiruchirappalli Circle.	Do.	1
Chief Engineer, Madras	Do.	2
Superintending Engineer (Highways), Coimbatore Circle	Do.	1

District Touring Maps.

Superintending Engineer, Madras Circle	Chengalpattu	10
	North Arcot	10
	South Arcot	11
	Thanjavur	14
	Salem	14
Superintending Engineer Tiruchirappalli Circle.	Tiruchirappalli	12
	Ramanathapuram	10

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT (HIGHWAYS).—*cont.*

Statement I.—cont.

Name of Officer.	*Nature of Map.*	*Number to be supplied.*
(1)	(2)	(3)
	DISTRICT TOURING MAPS—*cont.*	
Superintending Engineer, Tiruchirappalli. Circle—*cont.*		
	Madurai	11
	Coimbatore	15
	Tirunelveli	9
	The Nilgiris	7
	Kanyakumari	7
Chief Engineer, Madras	All districts	8
	TALUK MAPS.	
Superintending Engineer, Madras Circle.	Chengalpattu—	
	Saidapet	9
	Chengalpattu	8
	Madurantakam	8
	Kancheepuram	8
	Sriperumbudur	8
	Tiruvallur	9
	Ponneri	9
	North Arcot—	
	Arkonam	8
	Walajapet	9
	Vellore	9
	Gudiyatham	8
	Tirupathur	9
	Polur	8
	Chengam	8
	Cheyyar	8
	Tiruvannamalai	
	Arni	8
	Wandiwash .. .. -	8

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT (HIGHWAYS)—*cont.*

STATEMENT I—*cont.*

(1)	(2)	(3)
	TALUK MAPS—*cont.*	
Superintending Engineer, Madras Circle—*cont.*	South Arcot—	
	Tirukoilur	8
	Tindivanam	9
	Vridhachalam	9
	Chidambaram	9
	Cuddalore	9
	Villupuram	8
	Gingee	8
	Kallakurichi	8
Divisional Engineer, Thanjavur ..	Thanjavur—	
	Thanjavur	10
	Aranthangi	8
	Mannargudi	8
	Pattukkottai	8
	Kumbakonam	10
	Papanasam	9
	Mayavaram	1
	Nannilam	1
	Thiruthuraipoondi	1
	Nagapattinam	1
Divisional Engineer, Nagapattinam. ..	Mayavaram	11
	Sirkali	6
	Thiruthuraipoondi	8
	Nagapattinam	10
	Nannilam	8
	Pattukkottai	1
	Kumbakonam	1
	Salem—	
	Rasipuram	8
	Namakkal	9
	Tiruchengode	9
	Salem	9

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT (HIGHWAYS)—*cont.*

STATEMENT I—*cont.*

(1)	(2)	(3)
	TALUKS MAPS—*cont.*	
Divisional Engineer, Nagapattinam—*cont.*	Attur	8
	Omalur	8
	Karur	8
	Krishnagiri	9
	Dharmapuri	9
	Hosur	9
Superintending Engineer, Tiruchirappalli Circle.	Tiruchirappalli—	
	Karur	9
	Tiruchirappalli	9
	Udayarpalayam	9
	Lalgudi	8
	Perambalur	9
	Musiri	8
	Kulittalai	8
	Alangudi	9
	Tirumayam	9
	Kulattur	9
	Ramanathapuram—	
	Thiruvadanai	8
	Sattur	10
	Aruppukkottai	9
	Sivaganga	10
	Paramakudi	8
	Mudukulattur	8
	Ramanathapuram	9
	Tirupattur	9
	Madurai—	
	Dindigul	9
	Kodaikanal	8
	Nilakkottai	8
	Madurai	10
	Palani	9
	Melur	8
	Periakulam	8
	Tirumangalam	8

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT (HIGHWAYS)—*cont.*

Statement I—cont.

Name of Officer. (1)	*Nature of Map.* (2)	*Number to be supplied.* (3)
	TALUK MAPS—*cont.*	
Divisional Engineer, Erode ..	Coimbatore—	
	Bhavani	8
	Erode	9
	Gobichettipalayam	9
	Dharapuram	9
Divisional Engineer, Coimbatore ..	Avanashi	8
	Coimbatore	9
	Palladam	9
	Udumalpet	8
	Pollachi	9
	Tirunelveli—	
	Koilpatti	10
	Nanguneri	8
	Ambasamudram	8
	Tenkasi	8
	Tirunelveli	9
	Sankarankoil	9
	Tiruchendur	8
	Srivaikuntam	8
	The Nilgiris—	
	Coonoor	8
	Gudalur	8
	Ootacamund	8
Chief Engineer, Madras	All taluks in Tamil Nadu ..	3 sets.
	Town Maps	
Superintending Engineer, Madras Circle.	All towns in Chengalpattu, North Arcot, South Arcot, Thanjavur and Salem districts.	2 sets.
Superintending Engineer, Tiruchirappalli Circle.	All towns in Tiruchirappalli, Ramanathapuram, Madurai, Coimbatore, Tirunelveli and Nilgiris districts.	2 sets.
Chief Engineer, Madras	All towns in Tamil Nadu ..	2 sets.

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT (HIGHWAYS)—*cont.*

Statement I—cont.

Name of Officer. (1)	*Nature of Map.* (2)	*Number to be supplied.* (3)
	Ward Maps.	
Chief Engineer, Madras	All ward maps in the towns of Tamil Nadu.	1 set.
	Panchayat maps.	
Chief Engineer, Madras	Panchayat maps of all districts in Tamil Nadu.	1 set.
	Village maps.	
Superintending Engineer, Madras Circle.	All village maps in Chengalpattu, North Arcot, South Arcot, Thanjavur and Salem districts.	2 sets.
Superintending Engineer, Tiruchirappalli Circle.	All village maps in Tiruchirappalli, Ramanathapuram, Madurai, Coimbatore, Tirunelveli and Nilgiris districts.	2 sets.

CITY MAP OF MADRAS.

	3.3″ 1 *mile.* (1)	5″ 1 *mile.* (2)	10″ 1 *mile.* (3)	*Division map of Madras.* (4)	*Revenue block map.* (5)
Chief Engineer, Madras ..	2	8	2	1	1
Superintending Engineer, Madras Circle.	2	3	2	1	1
Divisional Engineer, Chengalpattu.	2	3	2	1	1

List of maps required for use and for distribution to the Temporary Establishment of Highways.

Name of Officer. (1)	*Nature of Map.* (2)	*Number to be supplied.* (3)
Divisional Engineer, Designs Division, Madras.	All District Touring Maps ..	1
Director, Research, Madras	Do. ..	1

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH.

Statement II.

Name of Officers.	*Nature of map.*	*Number to be supplied.*
(1)	(2)	(3)
Chief Engineer, Irrigation, Madras ..	Tamil Nadu Wall Map ..	1
Do. ..	Tamil Nadu District Atlas ..	2
Chief Engineer, General, Madras ..	Do. ..	2
Superintending Engineer, Coimbatore	Do. ..	3
Superintending Engineer, Madras Circle.	Do. ..	6
Superintending Engineer, Tiruchirappalli Circle.	Do. ..	5
Superintending Engineer, Thanjavur Circle.	Do. ..	6
Chief Engineer (Irrigation), Madras ..	Tamil Nadu Road Map ..	1
Chief Engineer (General), Madras ..	Do. ..	1
Superintending Engineer, Coimbatore Circle.	Tamil Nadu Road Map ..	1
Superintending Engineer, Madras Circle	Tamil Nadu Road Map ..	1
Superintending Engineer, Tiruchirappalli Circle.	Tamil Nadu Road Map ..	5
Superintending Engineer, Thanjavur Circle.	Tamil Nadu Road Map ..	6
	District Touring Maps.	
Chief Engineer (General), Madras ..	All Districts in Tamil Nadu	2 Sets.
Chief Engineer (Irrigation), Madras ..	Do.	2 Sets
Superintending Engineer, Coimbatore Circle.	Coimbatore	13
	The Nilgiris	5
	Salem	9
	North Arcot	5
Superintending Engineer, Madras Circle	Chengalpattu	10
	North Arcot	10
	South Arcot	14

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—cont.

Name of Officer. (1)	*Nature of the Map.* (2)	*Number to be supplied.* (3)
	DISTRICT TOURING MAPS—*cont.*	
Superintending Engineer, Tiruchirappalli Circle.	Tiruchirappalli	8
	Madurai	15
	Ramanathapuram	6
	Tirunelveli	9
Superintending Engineer, Thanjavur Circle.	Coimbatore	6
	Salem	6
	Tiruchirappalli	12
	South Arcot	12
	Thanjavur	23
	TALUK MAPS.	
	Coimbatore.—	
Superintending Engineer, Coimbatore Circle.	Coimbatore	4
	Avanashi	6
	Palladam	4
	Dharapuram	4
	Udumalpet	4
	Pollachi	4
	Gobichettipalayam ..	4
	Bhavani	5
	Erode	4
	The Nilgiris—	
	Ootacamund	4
	Gudalur	4
	Coonoor	4
	North Arcot—	
	Tiruppattur	4
	Salem—	
	Attur	4
	Omalur	6
	Tiruchengode	5
	Namakkal	5
	Rasipuram	4

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—*cont.*

Name of Officer.	*Nature of Maps.*	*Number to be supplied.*
(1)	(2)	(3)
.. ..	Taluk Maps—*cont.*	
.. ..	Salem—	
Superintending Engineer, Coimbatore Circle—*cont.*	Salem	4
	Yercaud	4
.. .. ..	Krishnagiri	4
.. ..	Hosur	4
.. .. ..	Harur	4
.. .. ..	Dharmapuri	4
Superintending Engineer, Madras Circle	Chengalpattu—	
	Ponneri	11
..	Tiruvallore	9
.. ..	Saidapet	14
	Sriperumbudur	7
	Kancheepuram	11
	Chengalpattu	11
	Madurantakam	9
	North Arcot—	
	Vaniyambadi	4
	Tiruppattur	4
	Vellore	4
	Arkonam	9
	Wallajah	10
	Gudiyatham	5
	Polur	5
	Arni Jagir	4
	Cheyyar	9
	Tiruvannamalai	5
	Chengam	4
	Wandiwash	4
	South Arcot—	
	Tirukoilur	4

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—*cont.*

Name of Officer.	*Nature of Map.*	*Number to be supplied.*
(1)	(2)	(3)
	Taluk maps—*cont.*	
Superintending Engineer, Tiruchirappalli Circle.	Tiruchirappalli—	
	Tiruchirappalli	7
	Kulithalai	7
	Karur	7
	Musiri	9
	Perambalur	7
	Lalgudi	9
	Udayarpalayam	7
	Madurai—	
	Periakulam	12
	Nilakkottai	25
	Madurai	25
	Melur	16
	Kodaikanal	8
	Dindigul	8
	Palani	8
	Tirumangalam	8
	Ramanathapuram—	
	Tirupattur	8
	Tiruvadanai	8
	Sivaganga	8
	Paramakudi	8
	Ramanathapuram	8
	Mudukulathur	8
	Aruppukottai	8
	Sattur	8
	Srivilliputtur	8

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—*cont.*

Name of Officer.	*Nature of Map.*	*Number to be supplied.*
(1)	(2)	(3)
	Taluk maps—*cont.*	
Superintending Engineer, Tiruchirapalli Circle—*cont.*	Tirunelveli—	
	Srivaikuntam	17
	Tiruchendur	11
	Nanguneri	7
	Tirunelveli	23
	Sankarankoil	11
	Kovilpatti	7
	Tenkasi	11
	Ambasamudram	9
Superintending Engineer, Thanjavur Circle	Thanjavur—	
	Thanjavur	25
	Kumbakonam	16
	Mayuram	13
	Shikali	8
	Nannilam	13
	Papanasam	23
	Nagapattinam	12
	Tiruthuraipoondi	12
	Mannargudi	12
	Pattukkottai	20
	Arantangi	4
	South Arcot—	
	Chidambaram	17
	Cuddalur	7
	Vridhachalam	8
	Kallakurichi	4
	Tirukoilur	9
	Villupuram	10
	Tindivanam	4
	Gingee	4

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—*cont.*

Name of Officer.	*Nature of Map.*	*Number to be supplied.*
(1)	(2)	(3)
	TALUK MAPS—*cont.*	
Superintending Engineer, Thanjavur Circle—*cont.*	Tiruchirappalli—	
	Tiruchirappalli	12
	Musiri	5
	Lalgudi	6
	Udayarpalayam ..	6
	Kulitalai	6
	Karur	4
	Coimbatore—	
	Erode	4
	Salem—	
	Namakkal	4
	Tiruchengode	4
	TOWN MAP.	
Superintending Engineer, Coimbatore Circle, Coimbatore.	All Towns in Coimbatore the Nilgiris, Salem districts and Tirupattur taluk of North Arcot District.	2 each.
Superintending Engineer, Madras Circle.	Kancheepuram	3
	Chengalpattu	3
	Tiruvellore	3
	City Map of Madras 3·3"=1 Mile. ..	11
Superintending Engineer, Tiruchirappalli Circle.	Tiruchirappalli	3
	Srirangam	3
	Karur	3
	Madurai	7
	Periakulam	4
	Kodaikanal	4
	Dindigul	4

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—*cont.*

Name of Officer.	*Nature of Map.*	*Number to be supplied.*
(1)	(2)	(3)
Superintending Engineer, Tiruchirappalli Circle—*cont.*	Palani	4
	Virdhunagar	4
	Karaikudi	4
	Srivilliputtur	4
	Palayamkottai	3
	Tuticorin	3
	Tirunelveli	3
	Bodinayackanur	4
Superintending Engineer, Thanjavur Circle.	Thanjavur	7
	Kumbakonam	3
	Mayuram	3
	Nagapattinam	4
	Tiruvarur	2
	Tiruthuraipoondi	3
	Mannargudi	7
	Cuddalore	2
	Chidambaram	2
	Villupuram	2
	Tiruchirappalli	2
	Srirangam	2
Chief Engineer (General)	All Towns in Tamil Nadu	1 Set.

TOWN MAPS.

Chief Engineer (Irrigation)	All Towns in Tamil Nadu ..	1 Set.

WARD MAPS.

Superintending Engineer, Thanjavur Circle.	Thanjavur	3
	Kumbakonam	1
..	Mayuram	2

REVENUE BLOCK MAP OF MADRAS CITY.

uperintending Engineer, Madras Circle.	All the Block Maps of Madras City.	2 Sets.
	Block Maps relating to Buckingham Canal division	3 copies each.

ANNEXURE XI—*cont.*

PUBLIC WORKS DEPARTMENT—IRRIGATION AND GENERAL BRANCH—*cont.*

Statement II—*cont.*

Name of Officer.	*Nature of Map.*	*Number to be supplied.*
(1)	(2)	(3)
	VILLAGE MAP.	
Superintending Engineer, Coimbatore Circle.	All the villages in Coimbatore, The Nilgiris, and Salem districts and Tirupattur taluk of North Arcot district.	3 copies each.
Superintending Engineer, Madras Circle.	All villages in Chengalpattu Saidapet, Sriperumbudur, Kancheepuram, Maduran-takam, Ponneri, Tiruvallure of Chengalpattu district and Vaniambadi, Tirup-patur, Vellore, Arkonam, Wallajah, Gudiyatham, Polur, Arni and Cheyyar taluks of North Arcot district.	3 Do.
	Villages related to Buckingham Canal affected portions.	3 Do.
Superintending Engineer, Tiruchirap-palli Circle.	All villages in Tiruchirappalli districts.	5 Do.
	All villages in Madurai, Rama-nathapuram and Tirunelveli district.	3 Do.

ANNEXURE—XI—*cont.*

PUBLIC WORKS DEPARTMENT—NATIONAL HIGHWAYS.

(*For Office Use Only*)

Name of Officers	*Kind and Number of copies of maps to be supplied.* *Tamil Nadu wall Map.*	*TamilNadu Dist. Atlas.*	*TamilNadu Road Map.*	*District Touring Maps.*	*Taluk MaPs*
Chief Engineer, Madras.	1	1	1	1	1
Superintending Engineer. Madras	1	1	1	1	1

(One set of map in each of all Districts and taluks in Tamil Nadu).

Name of Officer.	*Nature of map.*	*Number to be supplied.*
(1)	(2)	(3)
Chief Engineer, Madras and Superintending Engineer, Madras.	Town maps, (All Towns in Tamil Nadu).	1 set to each.
-do-	Ward maps (All ward maps in the Towns of Tamil Nadu).	-do-
-do-	*Madras City Maps* 3.3″ 1 mile 5″ 1 mile, 10″ 1 Mile.	-do-
-do-	Division maps of Madras City.	-do-
-do-	Revenue Block maps	-do-
Chief Engineer, Madras.	Panchayat maps of all Districts in Tamil Nadu.	1 set.
Superintending Engineer, Madras.	Village maps. All Villages in Tamil Nadu.	1 set

ANNEXURE XII.

STATE MARINE DEPARTMENT.

Name of Office.	*Jurisdiction of maritime District.*	*Name of Ports under jurisdiction.*
(1)	(2)	(3)
State Port Officer, Madras.	South Arcot, Thanjavur, Ramanathapuram, Tirunelveli and Kanyakumari.	All Ports in Tamil Nadu State.
Port Officer, Cuddalore O.T.	South Arcot district coastal area.	Cuddalore and Porto Novo.
Port Officer, Nagapattinam	Thanjavur and Ramanathapuram districts coastal area.	Nagapattinam, Adirampattinam of Thanjavur district, Pamban, Dhanushkodi, Kilakarai and Tondi of Ramanathapuram district.
Port Officer, Tuticorin.	Kanyakumari and Tirunelveli districts coastal area.	Colachel of Kanyakumari district and Kulasekarapattinam of Tirunelveli district.

ANNEXURE—XIII.

TRANSPORT DEPARTMENT

Name of Officer. (1)	*Jurisdiction.* (2)	*Road map.* (3)	*District Touring map.* (4)	*Taluk map.* (5)
Secretary, State Transport Authority, Madras	Tamil Nadu	6	3 sets	2 sets.
Regional Transport Officer, Chengalpattu.	Chengalpattu district.	1	Chengalpattu ..3 North Arcot ..1 South Arcot ..1	One copy under Jurisdiction.
Regional Transport Officer, Coimbatore.	Coimbatore district.	1	Coimbatore ..3 Madurai ..1 Nilgiris ..1 Salem ..1 Tiruchirappalli 1	Do.
Regional Transport Officer, Madurai.	Madurai district.	1	Coimbatore ..1 Madurai ..3 Ramanathapuram 1 Tiruchirappalli 1	Do.
Regional Transport Officer, The Nilgiris district.	The Nilgiris district.	1	Coimbatore 3 Nilgiris .. 3	Do.
Regional Transport Officer, North Arcot district.	North Arcot district.	1	Chengalpattu ..1 North Arcot .. 3 Salem ..1 South Arcot ..1	Do.
gional Transport Officer, Ramanathapuram.	Ramanathapuram district.	1	Madurai .. 1 Ramanathapuram 3 Thanjavur .. 1 Tiruchirappalli .. 1 Tirunelveli .. 1	Do.
Regional Transport Officer, Salem	Salem district	1	Coimbatore .. 1 North Arcot .. 1 Salem .. 3 South Arcot .. 1 Tiruchirappalli 1	Do.

ANNEXURE—XIV—*cont.*

TRANSPORT DEPARTMENT.

(1)	(2)	(3)	(4)	(5)
Regional Transport Officer, South Arcot.	South Arcot district.	1	Chengalpattu .. 1 North Arcot .. 1 Salem .. 1 South Arcot .. 3 Thanjavur .. 1 Tiruchirappalli 1	One copy under Jurisdiction.
Regional Transport Officer, Thanjavur.	Thanjavur district.	1	Ramanathapuram 1 South Arcot 1 Thanjavur 3 Tiruchirappalli 1	Do.
Regional Transport Officer, Tiruchirappalli.	Tiruchirappalli district.	1	Coimbatore .. 1 Madurai .. 1 Ramanathapuram 1 Salem .. 1 South Arcot 1 Thanjavur .. 1 Tiruchirappalli 3	Do.
Regional Transport Officer, Tirunelveli.	Tirunelveli district.	1	Madurai .. 1 Ramanathapuram 1 Tirunelveli 3	Do.
Motor Vehicle Inspector (13)	Tamil Nadu	13*		
Regional Transport Officer (13)	Do.	13‡		

*The map may be supplied to the Secretary, State Transport Authority, Madras for distribution to the Motor Vehicles Inspectors.

‡The maps may be supplied to the Regional Transport Officers concerned along with the maps already sanctioned for his use (Regional Transport Officer—One, and Regional Transport Office—one)

Name of office (1)	Jurisdiction (2)	Number to be supplied. (3)
	CITY MAP OF MADRAS.	
...tary, State Transport Authority, Madras.	3.3"=1 mile	3
...onal Transpor t Officer, ...	3.3"=1 mile, ...	1

ANNEXURE XIV.

SOLDIERS', SAILORS' AND AIRMEN'S BOARD.

Name of Office. (1)	*Jurisdiction.* (2)	*Number to be supplied.* (3)
Director of Ex-Servicemen's Welfare (Ex-officio) Madras-17.	Tamil Nadu wall Map	1
	Tamil Nadu District Atlas	1
	Tamil Nadu Road Map	1
	Division Map of Madras City	1
	District Touring Map	
Assistant Director of Ex-Service men's Welfare District Soldiers' Sailors' and Airmen's Board Madras-14.	Madras District.	1
Assistant Director of Ex-Service men's Welfare, District Soldiers' Sailors' and Airmen's Board, Chengalpattu district, Saidapet.	Chengalpattu District.	1
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and Airmen's Board, Vellore.	North Arcot District	1
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and Airmen's Board, Cuddalore.	South Arcot District.	1
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and Airmen's Board, Salem.	Salem District.	[illegible]
Assistant Director of Ex-Service men's welfare District Soldiers' Sailors' and Airmen's Board, Tiruchirappalli	Tiruchirappalli	[illegible]
Assistani Director of Ex-Service men's welfare District Soldiers' Sailors' and Airmen's Board, Madurai.	Madurai	[illegible]
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and Airmen's Board, Ramanathapuram at Madurai.	Ramanathapuram	1
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and Airmen's Board, Thanjavur.	Thanjavur	1

ANNEXURE XIV—*cont.*

(1)	(2)
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and Airmen's Board, Coimbatore.	Coimbatore .. .. ..
Assistant Director of Ex-Service men's welfare. District Soldiers' Sailors' and Airmen's Board, Tirunelveli at Palayamkottai.	Tirunelveli .. .. ..
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors' and, Airmens' Board, Kanyakumari at Nagereoil.	Kanyakumari .. ..
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors, and Airmen's Board, Nilgiris.	Nilgiris .. .. ..
Assistant Director of Ex-Service men's welfare, District Soldiers' Sailors, and Airmen's Board Dharmapuri.	Dharmapuri .. ..

ANNEXURE XV.

HINDU RELIGIOUS AND CHARITABLE ENDOWMENTS DEPARTMENT.

Name of Officer.	*Jurisdiction.*	*Number of copies to be supplied.*
(1)	(2)	(3)
Commissioner, Hindu Religious and Charitable Endowment. (Administration), Department, Madras.	District Touring Map-All Districts.	2 sets of each District.
Deputy Commissioner, Hindu Religious and Charitable Endowments (Admn.) Dept. Coimbatore.	Madras City, Chengalpattu, North Arcot, South Arcot, Salem, Coimbatore, Nilgiris and Tiruchirapppalli	1 each
Deputy Commissioner, Hindu Religious and Charitable Endowments (Admn.) Dept. Thanjavur.	Thanjavur, Tirunelveli, Ramanathapuram and Madurai.	1 each.
Verification Officer, Madras.	Tamil Nadu	1 copy of each district.
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration, Madras.)	Chengalpattu District	1
Assistant Commissioner, Hindu Religious and charitable Endowments (Administration), Cuddalore N.T.	South Arcot and North Arcot	1 copy of each district.
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration.) Nagapattinam.	Thanjavur	1
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration) Thanjavur.	Thanjavur	1
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration) Tiruchirappalli.	Tiruchirappalli	1
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration), Tirunelveli.	Tirunelveli	1
Assistant Commissioner, Hindu Religious and Charitable Endowments(Administration). Coimbatore.	Coimbatore, Salem and Nilgiris	1 copy of each district.
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration). Ramanathapuram.	Ramanathapuram District. ..	1

ANNEXURE XV—*cont*

HINDU RELIGIOUS AND CHARITABLE ENDOWMENTS DEPARTMENT—*cont*.

(1)	(2)	(3)
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration). Madurai.	Madurai District.	.. 1
	Taluk Maps—	
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration), Madras.	All Taluk maps of Chengalpattu District	2 copies of each Taluk.
Assistant Commissioner, Hindu Religious and Charitable, Endowments (Administration), Cuddalore N.T.	All taluk maps of south Arcot and North Arcot district.	2 copies of each taluk.
Assistant Commissioner,Hindu Religious and Charitable Endowments (Administration), Nagapattinam.	Nannilam, Nagapattinam, Mayuram, Sirkali and Tiruturaipundi of Thanjavur District.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration), Thanjavur.	Thanjavur, Orathanad, Pattukkottai, Papanasam, Kumbakonam, Mannargudi and Arantangi of Thanjavur District.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration), Tiruchirappalli.	All taluk maps of Tiruchirappalli District.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endowments (Administration), Tirunelveli.	All taluk maps of Tirunelveli District.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endwoments, Coimbatore.	All taluk maps of Coimbatore, Salem and Nilgiris district.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endowments, Ramanathapuram.	All taluk maps of Ramanathapuram district.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endowments, Madurai.	All taluk maps of Madurai district.	2 copies of each taluk.
Assistant Commissioner, Hindu Religious and Charitable Endowments, Madras.	City map of Madras—	3 copies

ANNEXURE—XVI.

CO-OPERATIVE DEPARTMENT

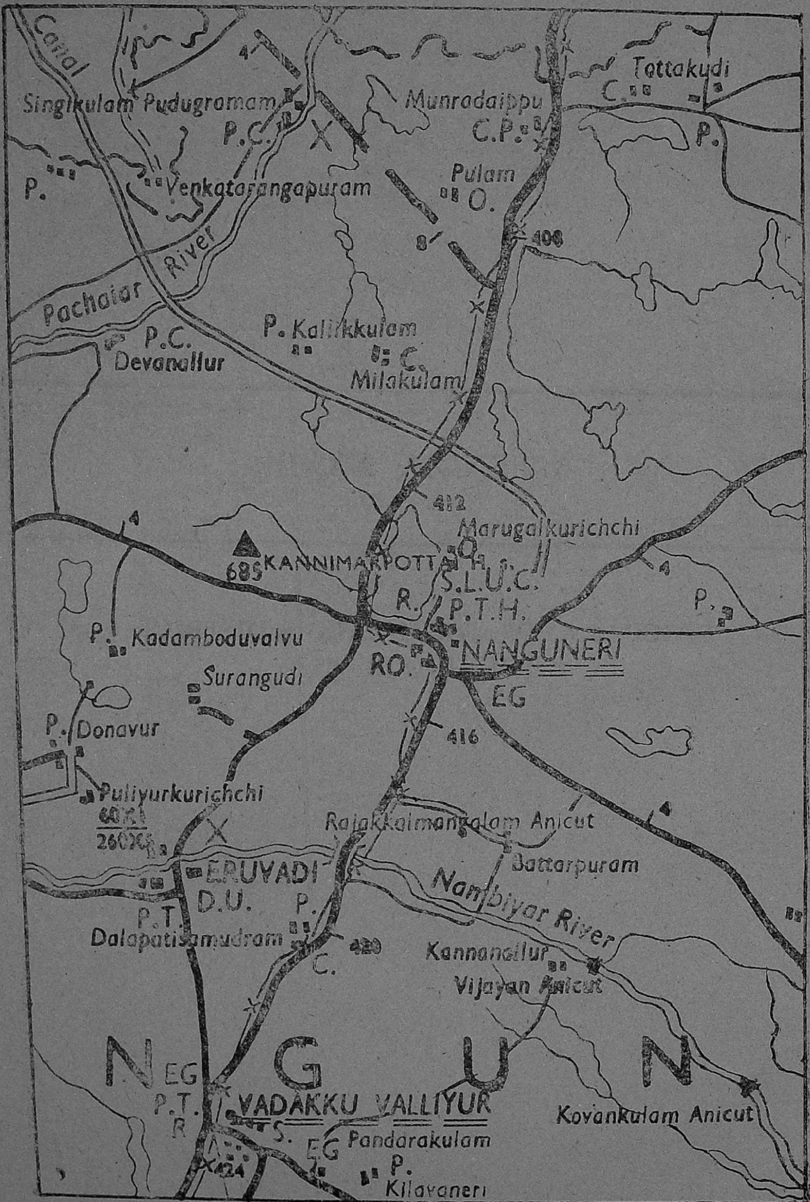
Name of Officer (1)	*Name of Map.* (2)	*No. of copies.* (3)
District Audit Officer, Co-operative Dept., Chengalpattu.	District Touring maps of the District concerned and maps of all taluks in the District.	1 Copy in each.
Do.	South Arcot District	Do.
Do.	North Arcot District	Do.
Do.	Madras District	Do.
Do.	Salem District	Do.
Do.	Coimbatore District	Do.
Do.	Thanjavur District	Do.
Do.	Tiruchirappalli District	Do.
Do.	Madurai District	Do.
Do.	Ramanathapuram District	Do.
Do.	Tirunelveli District	Do.

APPENDIX XXXIII.

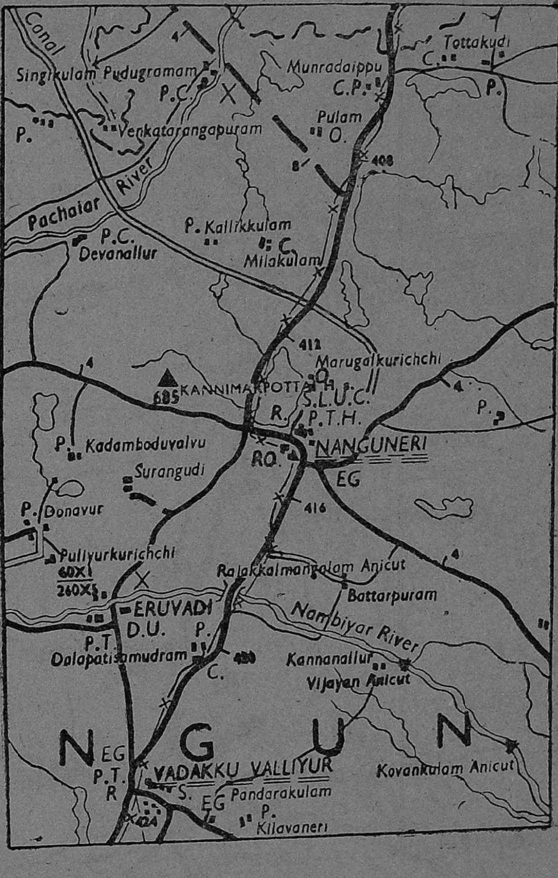
SPECIMEN FOR THE TALUK & DISTRICT TOURING MAPS

DISTRICT TOURING MAP

Original map on Scale 1 inch=2⅔ mile fit for ⅔ reduction to yield final print on Scale 1″=4 miles.

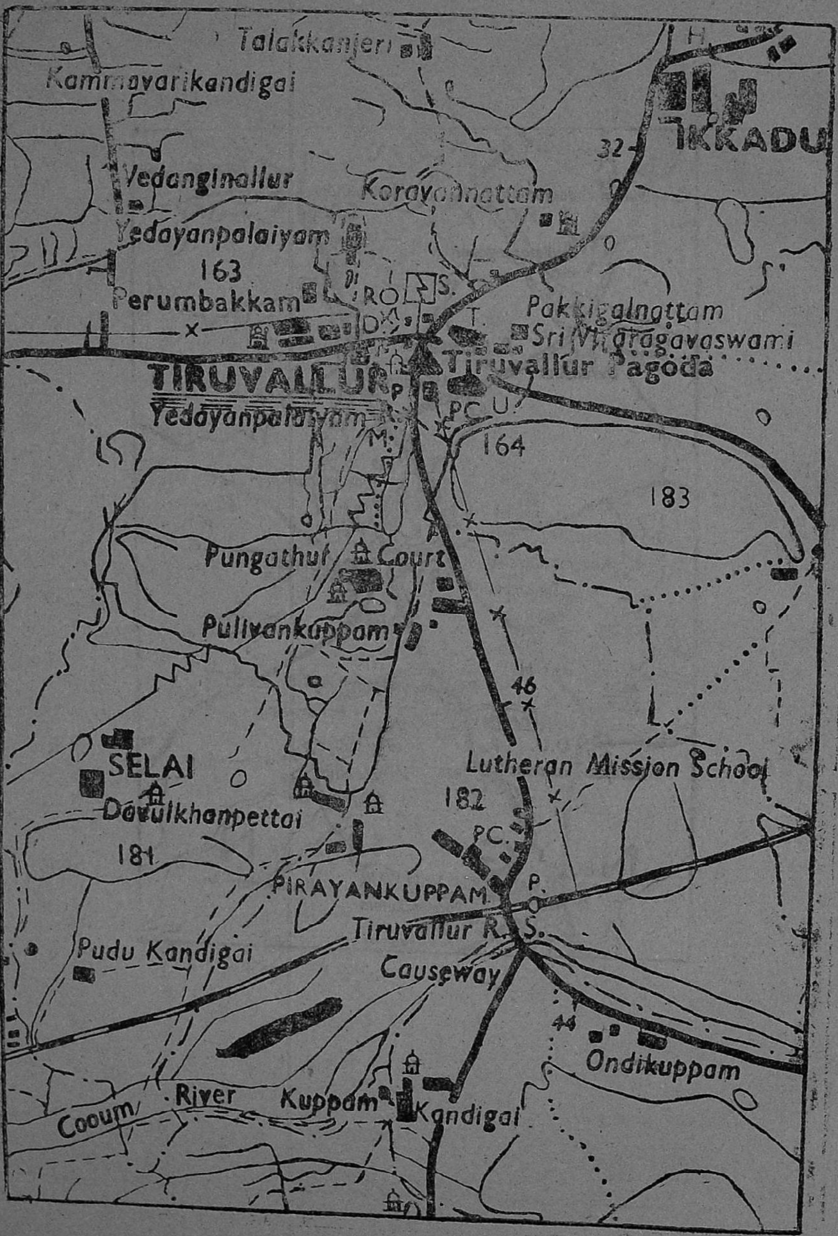


Drawing on opposite page reduced to ⅔ times
Final print on scale 1″=4 miles.

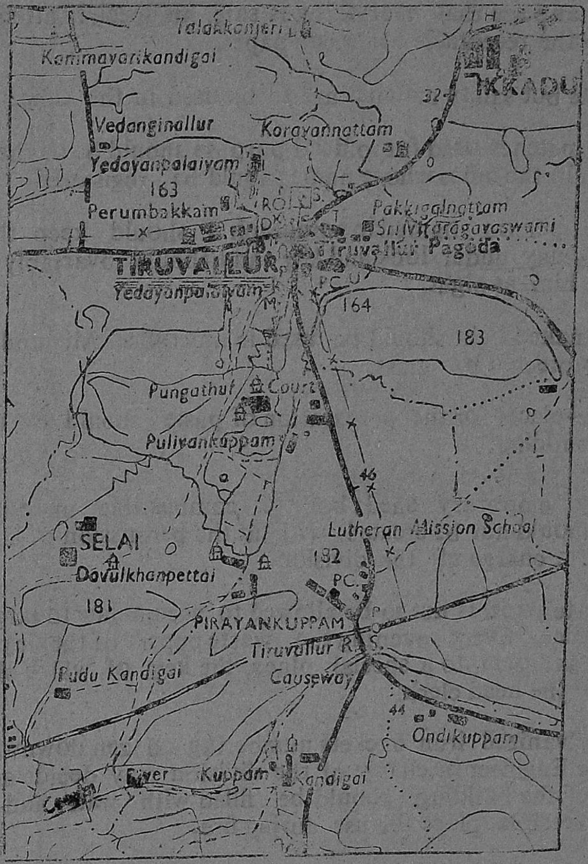


TALUK MAP.

Specimen drawing on scale $1\frac{1}{2}''=1$ mile fit for $\frac{2}{3}$rd reduction to yield
Final print on scale $1''=1$ mile,



Drawing on opposite page reduced to $\frac{2}{3}$ times.
Final print on scale 1″=1 mile.



APPENDIX XXXIV.

PRECAUTIONS AGAINST FIRE

1. Heads of offices are to direct the head clerks of their offices to see that the following rules are carried out and the head clerk is to be held responsible for this being done.

2. Before closing the office for the night, the head clerk will go round each room and see that everything is safe, his special attention being directed to the receptacle for waste paper.

3. None but safety matches are to be used in the office.

4. The matches used for official purpose should be in the custody of one person in the office whose name should be registered.

5. The person named in paragraph 4 should keep the matches during the day under lock and key and should invariably take them away with him at night.

6. No naked light should be used in any office. All candles or wicks must be protected by glass.

7. Fire-places for the preparation of paste should not be allowed near any building.

8. Any temporary sheds built of combustible materials for any purpose should not be erected without the permission of the Executive Engineer in charge of the division.

9. Waste paper is not to be allowed to accumulate in large quantities in any office. Every evening the waste paper of the day is to be collected and put into a special place, the key of which should be in charge of the head clerk.

10. Galvanized iron buckets numbering a dozen downwards, as the Executive Engineer in charge of the division may decide according to the size of the building, should be filled with water and kept in an easily accessible place for use during fire.

DETAILS OF TYPES USED IN FAIR ORIGINALS OF

1. VILLAGE MAP

2. COMPOSITE MAP & RECORD OF MEASUREMENT TRACING

3. ORIGINAL FAIR BLOCK MAP

4. WARD MAP

5. TOWN MAP

6. DISTRICT TOURING MAP

7. TALUK MAP

1 : 5000 VILLAGE MAP
GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. No.	Purpose for which the Type is used	Point	Specimen
1	2	3	4
	HEADING		
1	Village No. & Name	30	No. 8 KON
2	No. of Parts & Bits	30	(3 PARTS)
3	Bit or Part No.	30	PART I BIT
4	Taluk Name	24	NILAKOTTAI
5	District Name	18	MADURAI DISTRI
6	Traverse & Field Area	12	Area by Traverse, Fields
7	Scale	14	Scale 1 : 5000
8	Diagonal Scale, Figures & Names	10	100, 200, 400 Metres
9	No. & Name in Area Square	10	1 Hectare
	SIDE NAMES		
10	Village No. & Name	24	No. 65 MUPP

1	2	3	4
11	Bit or Part	24	(Bit I) (Part I)
12	Taluk Name	24	TIRUMANGA
13	Forest Name	24	RESERVED
14	Leading Name, Kilometre & Fractions	12	Arumbanur 1 km 14 12
	INSIDE NAMES		
15	Parent Name	12	KONDAYAMPATTI
16	Other Detail Name	12	Sivan Kovil
17	Field Nos.	12	12 34 567 890
18	Field Nos. in narrow space	10	12 34 567 890
19	Kilometre Figures	10	1 2 3 4 5 6
20	Khandam Nos.	24	2 4 6 8
	ENLARGEMENT		
21	Heading	14	ENLARGEMENT
22	Scale	12	Scale 1 : 2000
23	Side Village No. & Name	12	No. 47 ARUMBUR
24	Bit or Part	12	(Bit I) (Part II)
25	Inside & Side Nos. of the Fields	12	12 34 567 890
26	,, in narrow space	10	12 34 567 890
27	Parent Name	10	KONDAYAMPATTI
28	Other Detail Name	10	Pillayar Kovil
29	Foot Note	12	Notification under section
30	Imprints	10	Published by Thiru. R. SRIRAM

COMPOSITE MAP

GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. No.	Purpose for which the Type is used	Point	Specimen
	HEADING		
1	District Name	18	RAMANATHAPU
2	Name of Municipality	36	RAJAPAL
3	Name of Map	24	COMPOSITE
4	Scale	14	Scale 1:5000
	SIDE, INSIDE NAMES & Nos.		
5	Notification, Ref. & Leading Names	12	Notification under section
6	Village No. & Names	18	No. 9 SEMANGA
7	Cadastral Survey Nos.	14	12 34 56 78 90
8	Street Survey No.	10	*1 2 3 4 5 6 7 8 9*
9	Street Names	10	*South East Street*
10	Detail Names	8	RAJAPALAIYAM RAILWAY
11	Other Names	14	PATEL NAGAR
12	Kilometre Stone Nos.	8	1 2 3 4 5 6 7 8 9
13	Imprints	10	Published by Thiru. R. SRIRAM

RECORD OF MEASUREMENT TRACING

GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. No.	Purpose for which the Type is used	Point	Specimen
	HEADING		
1	Name of District	18	MADURAI
2	Town	24	NILAKOTTAI
3	Ward No.	18	Ward A
4	Block No.	24	Block No. 6
5	Scale	12	Scale 1:500
	SIDE NAMES		
6	Side Names	18	No. 9 SEMANGA
7	Block No.	24	4 5 6 7 8 9
	INSIDE Nos.		
8	Survey Nos.	14	12 34 56 78 90
9	(in narrow space)	10	12 34 56 78 89 90
	REFERENCE		
10	Heading	12	REFERENCE
11	Survey Nos.	14	19 28 37 46
12	Name shown in Ref for Survey Nos.	14	Bazaar Street

ORIGINAL FAIR BLOCK MAP

GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. No.	Purpose for which the Type is used	Point	Specimen
1	2	3	4
	HEADING		
1	Name of District	24	SALEM
2	Town	48	**SALE**
3	Ward No.	30	WARD A
4	Nature of map	30	Revenue
5	Block No	48	**BLOC**
6	Scale	14	Scale 1:500
	SIDE NAMES		
7	Village No. & Name	30	No. 4 HARI
8	(in narrow space)	24	No. 4 HARIN
9	Ward No.	30	WARD A
10	Block Nos.	48	**58 67**

1	2	3	4
	DETAIL NAMES		
11	Survey Nos.	24	19 28 37 46 55
12	(in narrow space)	18	19 28 37 46 55
13	Public buildings	14	MUNICIPAL OFFICE
14	G. T. Station	24	G. T. S.
15	Symbols	12	Mosque, Church, Temple
16	Road	18	COURT ROAD
17	Street	18	MAIN STREET
18	Lane	14	RAMAN LANE
19	Tank	18	Tamarai Kulam
20	Railway Name	12	*SOUTHERN RAILWAY*
	OTHER NAMES		
21	Note Names	14	Notification under section
22	Imprints	14	Published by Thiru. R. SRIRAM
23	Key Name and No.	14	No. 104 Kavanur
	ENLARGEMENT		
24	Heading	14	ENLARGEMENT
25	Scale	14	Scale 1 : 2000
26	Side Name Ward No.	18	WARD F KODIK
27	Side figures	18	8 34 45 79 83
28	Block Nos.	30	10 45 80

WARD MAP

GILLSANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. No.	Purpose for which the type used	Point	Specimen
1	2	3	4
	HEADING		
1	District	30	MADURAI
2	Town		(Hand Drawn)
3	Ward	48	WAR
4	Name of the Map	30	TOPOGRA
5	Scale	30	1:5000
6	Scale	30	
7	Area	14	AREA BY TRAVERSE
	SIDE NAMES		
8	Ward	48	WAR
9	Village	48	No. 12
	DETAIL NAMES		
10	Parent Name	30	PALAVAL
11	Block	30	BLOCK 28

	2	3	4
	Locality	24	SRINAGAR
13	Public Buildings	24	COURT
14	Public Buildings	24	Hospital
15	Other Buildings	14	School Mark
16	G. T. S.	14	G. T. S.
17	Road	24	MOUNT RO
18	(in narrow)	14	BELLS ROAD
19	Street	14	Pillayar Kovil Street
20	(in narrow)	12	Saravanan Street
21	River	30	CAUVERY
22	Tank	14	Thamarai Kulam
23	Railway	14	SOUTHERN RLY
24	Reference	24	REFERENCE
25	Note	14	Notification under
26	Imprints	24	Published at

TOWN MAP

GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. Nos.	Purpose for which the type is used	Point	Specimen
1	2	3	4
	HEADING		
1	District	30	MADURAI
2	Town	60	**SALE**
3	Map Name	24	TOWN MAP
4	Extension	18	(WITH EXTEN)
5	Scale	18	SCALE
6	Scale	14	1 : 10,000
7	Area	18	Area 182 . 7 Sq. km.
8	Diagonal Scale Figures	12	100 0 5 10 15
	DETAILS		
9	Ward	30	WARD
10	(in narrow space)	18	WARD No. 2
11	Village	30	No. 9 TER
12	(in narrow space)	18	No. 9 TERKU
13	Town Extension	14	(Town Extension)

1	2	3	4
14	Parent Name	24	VANDANAM
15	(in narrow space)	18	VANDANAM
16	Hamlet Name	24	Naranapuram
17	(in narrow space)	18	Naranapuram
18	Reserved Forest	14	*KUTCHI MALAI*
19	Government Offices	14	Collector's Office
20	Other Office	12	Travellers' Bungalow
21	Road	14	**STANLEY ROAD**
22	(in narrow space)	12	**STANLEY ROAD**
23	(in narrow space)	10	**STANLEY ROAD**
24	Street	14	*Kesava Pillai Street*
25	(in narrow space)	10	*Kesava Pillai Street*
26	Lane	12	*South Car Lane*
27	(in narrow space)	10	*South Car Lane*
28	Tank	14	Thamarai Kulam
29	Railway	14	**SOUTHERN RAIL**
30	Gauge	14	**Metre Gauge**
31	Kilometre stone	12	1 2 3 4 5 6 7 8
32	Reference Heading	18	REFERENCE
33	Reference	14	Important Buildings
34	Imprints	14	Revised and

DISTRICT TOURING MAP

GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. Nos.	Purpose for which the type is used	Point	Specimen
1	2	3	4
	HEADING		
1	District	48	**THAN**
2	Hill Particulars	14	WITHOUT HILLS
3	Using Particulars	18	FOR THE USE OF
4	,,	30	TOURING
5	Scale	14	Scale 1 : 2,50,000
6	Diagonal Scale Figures & Names	10	Metres 10 15 20 30
7	Area	18	Area 182.7 Sq. km.
	INSIDE & SIDE NAMES		
8	Inside & Side Taluk Names	30	SIVAGANG
9	More than 5000 Population	12	*THANJAVUR*
10	Other Important Village & Leading Names	10	*Pattukkottai*
11	River Names	12	*CAUVERY* *Cauvery*
12	Channel, Canal & Other Names	10	*Periya Pallam*

1	2	3	4
	Names	14	Kantampala
	Kilometre Stone Figures	8	2 4 6 8 10 12 14
15	Railway Gauge	8	BROAD GAUGE
16	Railway Name	12	SOUTHERN RAIL
17	G. T. Names	8	HILL PEAK
18	G. T. Height in Figures	10	150 250
19	R. S. Names	12	*Anangur R. S.*
20	R. F. Names	8	*234 SELUR EXTEN*
21	Leading Names	10	*Palladam*
22	Symbols	12	*P. T. S. H.*
23	Reference Heading Name	30	REFERENC
24	Note & Reference	12	District Boundary
25	'G' Line Degree Figures	24	30 35 40
26	'G' Line Minute Figures	12	15 20 25 30
27	Imprints	12	under the Superinten

TALUK MAP

GILL SANS SPECIMEN TYPE USED FOR FAIR ORIGINAL

S. Nos.	Purpose for which the Type is used	Point	Specimen
1	2	3	4
	HEADING		
1	Name of Taluk	48	**KARU**
2	Name of District	30	TIRUCHI
3	Scale	14	SCALE 1 : 50,000
4	Area	18	Area 483.19 Sq. km
	SIDE NAMES		
5	Name of Taluk	30	PAPANASA
6	(in narrow space)	18	PAPANASAM
7	Name of District	14	MADURAI DISTRICT
8	(in narrow space)	12	MADURAI DISTRICT
9	Railway Line Leading Name	12	*Manamadurai R. S.*
10	Road Leading Name	12	Manamadurai
	INSIDE NAMES		
11	Population 5000 & above	14	**KULATHUR**
12	,, 2001 to 4999	14	MANGALAM
13	,, 1001 to 2000	12	*SEMBEDU*
14	,, 501 to 1000	10	KULATHUR
15	,, 500 & Below	12	Sankari

1	2	3	4
16	Haml~ Village Names	12	*Chinna Palaiyam*
17	Forest Names	12	*RESERVED FOREST*
18	Railway Names	10	SOUTHERN RAILWAY
19	Railway Gauge Names	10	Metre Gauge
20	Railway Station Names	10	*Madurai Junction R. S.*
21	G. T. Station Names	12	Narasimugu h. s.
22	G. T. Height in Figures	12	123 456 789
23	Hill Names	12	Tedlagattu Hill
24	River Names	12	*VAIGAI RIVER*
25	(in narrow space)	12	*Vaigai River*
26	Tank & Channel Names	12	*Elluru Canal*
27	Village numbers	12	19 28 37 46
28	Kilometre Stone Figures	10	*1 2 3 4 5 6 7*
29	Map Abbreviation	10	RD LFC PC
30	Crossings	14	X
31	'G' Line Degree Figures	18	85 86 94
32	'G' Line Minute Figures	14	5 10 15 20
33	Reference Heading	24	REFERENCE
34	Reference Names	12	Village Boundary
35	Note Names	12	Longitudes
36	Imprints	12	*Published under the*

Reg. No. 68/84

LIST OF AGENTS FOR THE SALE OF TAMIL NADU GOVERNMENT PUBLICATIONS.

IN MADRAS CITY.

1 Account Test Institute, Egmore, Madras-8.
2 The City Book Company, Madras-[illegible]
3 Higginbothams (Private) Limited, Madras-2.
4 P. Varada[illegible] and Company, [illegible]
5 [illegible] Subbiah Chetty and Company, Madras-[illegible]
6 The University Book House, [illegible] Market, Madras 3.
7 C. [illegible]tharaman and Company, Madras-1[illegible]
8 Mohan Patippagam and [illegible] Depot, Madras-[illegible]
9 C. Venkatesan Chetty [illegible] No. 2-C, Pycrofts Road, Madras-[illegible]
10 The [illegible] Saiva Siddhantha [illegible] Publishing Society (Tinnevelly), Limited, Madras-1.
11 The [illegible] Publications, No. [illegible] Sunkurama Chetty Street, Madras-1.
12 [illegible] Book House (Private) Limited, Madras-2.
13 Kalai[illegible] Book Centre, No. [illegible] Ponnammal [illegible] Koil Street, Egmore, Madras-[illegible]

IN MOFUSSIL OF TAMIL NADU.

1 [illegible] V[illegible]nasubban and Company, Vellore (North Arcot) District.
2 [illegible] Book Depot, Thanjavur (Thanjavur District).
3 [illegible] Nathan and Company, Kumbakonam (Thanjavur District).
4 [illegible] Book Stall, [illegible]
5 [illegible] and Company Bazaar Street, Pudukkottai
6 [illegible] Tiruchirappalli-2.
7 S. [illegible] Pillai, [illegible]veli Junction.
8 B[illegible]ess, Villupuram [illegible] Arcot District.
9 Vasantham Stores, Booksellers, [illegible] Cut Road, Coimbatore-12
10 Mercury Book Company, [illegible] Karuppa Gounder Street, Coimbatore-1.
11 [illegible] M. [illegible]agannathan Book House, [illegible] Koil Street, Tiruchirappalli-1.
12 Ganesh Stores, South Car Street, Siva[illegible]
13 [illegible] Martin, Booksellers, K[illegible]
14 [illegible] Chandriah Chettiar and Sons, [illegible]
15 [illegible]eswari Book Shop, No. [illegible] Street, Salem.
16 Meenakshi Pathippagam, [illegible]
17 K. [illegible] District.
18 [illegible]
19 Ba[illegible] Stores, Booksellers, Vill[illegible]am (South [illegible] District).
20 [illegible] Stores, [illegible] Post Office [illegible], Coimbatore-18.
21 [illegible] Book [illegible]
22 Vela Book Company, No. [illegible] An[illegible], Erode-1.
23 [illegible] Stores, [illegible]
24 Ajantha Book Centre, Salem[illegible]
25 Sri Vidya, 63, Tennur High Road, Tiruchirappalli-2.
26 Sri Ramadas Book Shop, [illegible] Sannathi, Madurai-1.

IN OTHER STATES

1 Jain Book Agency, New Delhi[illegible]
2 International Book House, Trivandrum[illegible]
3 International Book House, [illegible]
4 The Book Syndicate, Hyderabad[illegible]
5 Labour Law Publications, Hyderabad.
6 Puthagalayam, Pondicherry[illegible]
7 Prabhu Book Service, Gurgaon, Haryana
8 K. P. Bagchi and Company, [illegible] B. B. Ganguli Street, Calcutta-12